ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

August 1939 McGraw-Hill Co. of California 25 Cents

fast
NO COOKING METHOD EXCEEDS THE SPEED OF ELECTRICITY
Modern
August
1939
SUN MON TUE WED THU FRI SAT
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
ELECTRIC COOKING IS SO CLEAN

Edison Advertising

HITS JUST AS HARD IN AUGUST AS DECEMBER

★ There's no summer slump in Edison advertising. It's on the job every day—in newspapers, magazines, direct mail—developing prospects that can be developed into profitable sales. When you're tempted to close the door and go fishing, remember that August is one of the biggest months of the year in furniture, furs, automobiles and many other lines. Edison advertising, plus two-fisted selling, can divert a good many of these dollars into appliance sales. Will you get your share?

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

8-39

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), August, 1939, Vol. 83, No. 2. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shillings). Single copy 25c.
Copyright, 1939, McGraw-Hill Company of California.

HERE'S HOW YOU SAVE WITH G-E UNIT SUBSTATIONS

Accessibility of controls for inspection and adjustment is evident in this view of a single-circuit unit substation, installed in a substation of the Alabama Power Co., at Montgomery, Alabama

They're Easy to Install . . . .

because they're completely assembled at the factory

They're Inexpensive to Install . . . .

because they require no elaborate overhead structure

They Reduce Losses . . . .

because they can be installed near load centers—even in residential areas where conventional overhead structures would be objectionable

They Reduce Real Estate Expense . . . .

because their compact design decreases their space requirements.

EACH of these points means savings for you—sometimes totaling as much as *twenty-five per cent!* Then, too, the unit substation is easily moved to a new location, a valuable advantage if load grows in an unanticipated direction.

When you're planning to serve a new area, be sure to get the complete story on unit substations from your G-E representative. General Electric, Schenectady, N. Y.

★

The simplified overhead structure and the compact substation unit provide an attractive installation for the Coast Counties Gas and Electric Company at Felton, Calif.

GENERAL ELECTRIC

BETWEEN THIS MONTH'S COVERS

Midnight Sun

TRAGEDIES IN TRAFFIC (p. 19): The record for more than 1,000 miles of highway lighting shows that traffic fatalities at night have been reduced on the order of 40-50% where lights are used. A survey of 277 cities shows that antiquated, lowest-cost lighting and greatest night fatalities go hand in hand. This growing body of statistics is beginning to convince people what electricity can do. W. P. Bear, lighting engineer, P. G. and E., tells about it.

EEI and the Code

WHAT THE EEI PROPOSES (p. 21): Finally the Edison Electric Institute has documented its case for the changes it wants made in the National Electric Code and presented it to the electric inspectors. Since the convention of the two sections, Northwestern and Southwestern, in San Francisco Aug. 14-17, will consider these proposals as a part of the review of code articles and suggested changes, this summary will serve as a guide. The proposals include EEI's recommendations for use of thinner insulations on conductors, use of more of the space in conduit in rewiring old buildings, bare and covered neutral, and its own wiring material development, concentric cable.

Los Angeles Depot

LET'S STOP AT LOS ANGELES (p. 22): Three transcontinental railroads now terminate their Westbound runs at Los Angeles' union depot. Matching such comforts as cushioned chair benches, outdoor patios, are better light, clearer train announcements and other conveniences made possible by an electrical installation which changes that end-of-the-journey scurry to a pleasant event. Behind the scenes is long, careful planning.

Bright Offices

THEY MOVE TO FIND LIGHT (p. 25): Miss La Velle Mitchener is a young lady who insists on improved lighting in every office lease she makes. Her sales career started with the Frigidaire Corp. in Oklahoma, where she quickly became zone sales manager in charge of commercial refrigeration. She tells Walter Heston, industrial engineer Pacific Coast Electrical Bureau, northern division, that an office can be rented, even though old, if modernized and well-lighted.

Data on 200 Subs

HOW PACKAGE SUBS ARE USED (p. 30): Package subs are those in which all the components of a substation are combined at the factory into one assembly, which is shipped ready for connection to the lines. It has been possible to compare these with the usual substation rather accurately on paper. But installations have been too few to afford comprehensive field data. Now, Northwest companies report practices adopted with more than 200 units. Applications are mostly 3-phase rural, in capacities 300-3,000 kva. Single-phase applications appear generally improbable.

No Boiler, No Pistons

THE GAS TURBINE COMES OF AGE (p. 36): For years a dream, the combustion gas turbine failed to be practical because more energy was taken by the compressor than was delivered by the turbine. Brown-Boveri, in Switzerland, have developed units with cycle efficiencies exceeding 18%, and 13 units have been built, mainly in this country. When temperatures can be raised, efficiency will rise. Because gas turbines need no water, burn low-grade fuel, they may be important to the West.

Engineer-Authors

AMONG ENGINEERING CONTRIBUTORS: A. Shipek, Puget Sound P. & L., on package subs; A. Frank Ayres, Nev-Cal Electric, on semi-automatic generation; T. M. Blakeslee, L. A. Bureau of P. & L., on voltage control for testing; E. F. Anderson, Pepco, on phase relations of the Northwest interconnection.

New Products	4
Product Data	10
Electra's Husband	15
Industry	19
Lighting	21
Engineering	30
Sales Parade	37
Sales Guide	41
Rural	46
Editorials	48
Associations	50
News of the Industry	54
Profiles of the Month	76

Cover: Typical lighting in a section of the Hall of Fine Arts at the Golden Gate International Exposition on Treasure Island. See page 29 for the whole story.

Rural Electric ABC's

MODEL SHOWS FARMERS ELECTRIC VALUES (p. 46): Teaching any customer the reason why good wiring pays is a tough nut to crack if the customer is not electrically minded. But when to this one lesson are added all the others which are needed before electricity can be used efficiently on the farm, a first-class job is to be faced. To make the job a comparatively easy one, Pepco has developed a model which enables a farmer to visualize how he can exploit electric service to his greatest benefit. G. H. Bliesner, Pepco agricultural engineer who developed the equipment, explains just how it works.

Convention Months

CAVALCADE OF EVENTS (p. 50): Both August and September are packed brimful with conventions, conferences and just plain meetings, most of them centering around the Golden Gate international Exposition. Exceptions are the Rocky Mountain Electrical League annual convention at Estes Park, Sept. 16, whose theme is tied in with the 60th anniversary of Edison's lamp; and the electrical contractors all-California meeting at Asilomar, Sept. 22. The joint meeting of electrical inspectors, Northwestern and Southwestern Sections, is ready for Aug. 14-17, followed immediately by a League Managers conference and the first National Adequate Wiring Bureau conference, Aug. 17-18, all in San Francisco. On heels of this is the first national convention of the Illuminating Engineering Society to come into the far West.

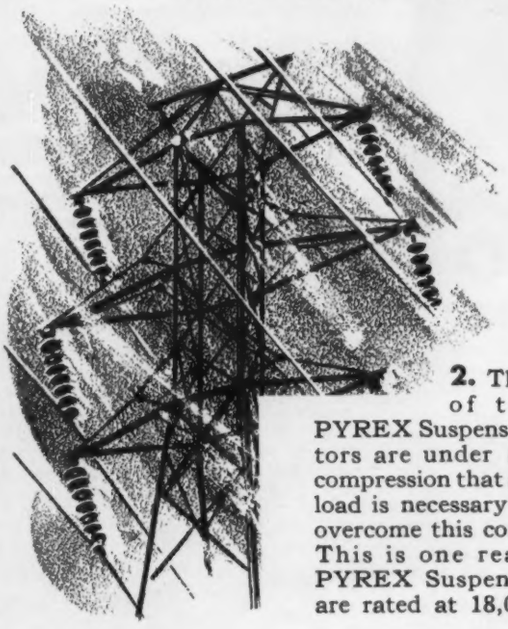
Activity In Print

NEWS OF THE INDUSTRY (p. 54): Puget Sound and Seattle City Light reduce rates. . . . PUDS get favorable court ruling on their condemnation proceedings. . . . Washington State Court still kept humming by various county and public utility cases. . . . San Francisco asks Congress to amend the Raker Act. . . . Seavy named Federal Power Commission chairman. . . . Bonneville hustles along with new rate and construction programs; new appointments are made. . . . geologist says Lake Mead is causing more earthquakes in Hoover Dam region.

BELIEVE ME! By HARDGUY PETE

1. "Lightning Tests" prove that PYREX Suspension Insulators withstand terrific power arcs! Shields hold the arcs against the insulators throughout their entire path. The units withstand at least 3800 amperes in this manner for one second, without failing.

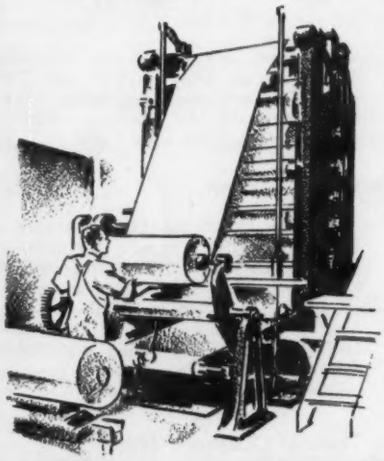
This test simultaneously proves resistance to three common hazards—sudden temperature change, intense "spot" heating, and destruction of insulating surface. There is no glaze to chip or crack.



2. The surfaces of tempered PYREX Suspension Insulators are under such high compression that a large line load is necessary merely to overcome this compression. This is one reason why PYREX Suspension units are rated at 18,000 lbs.

3. You can't hide a defect in a PYREX Insulator. When the testing table checks up, it rejects only 1/40 of one percent of the PYREX Insulators passed by visual inspection.

4. Where the going is the toughest—look for PYREX Insulators. A southern utility writes "Your Pin Type Insulators have successfully withstood the local paper mill deposit considerably longer than any other insulators we have ever tried."



INVITATION TO POWER MEN!

It's open house at Corning anytime you're nearby! Drop in and see how we make glass—and why PYREX brand glass makes better insulators!

PYREX INSULATORS

"PYREX" is a registered trade-mark and indicates manufacture by
CORNING GLASS WORKS, CORNING, N.Y.

Visit the Glass Center at the New York World's Fair

WHY KLEINS?

No. 201 N. E. Klein Side Cutting Plier. "Streamlined" for use in confined spaces.

Good workmen demand good tools. In the hands of men who know—everywhere—the pliers are invariably Kleins. Only the keen, hand-honed, perfectly matched cutting knives of Klein Pliers—only the comfortable spring grip in the Klein handles—only the general all around quality that is an inherent part of every Klein Plier can satisfy men whose work demands the best in tools. This, perhaps, explains why Klein Pliers are the standard of quality by which others are judged—why the name Klein has stood for maximum quality, "since 1857."

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

---

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

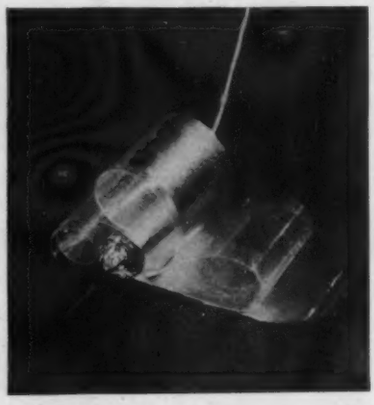
Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.

3200 BELMONT AVENUE

NEW PRODUCTS

Polystyrene (801)

Development of polystyrene film for electrical insulation purposes has been announced by Bakelite Corp. Low power factor produces capacitors which are extremely efficient. Electrical properties will remain constant even at



varying temperatures. The film is water white in appearance, but may be had in a tinted shade of purplish black. It is supplied in ribbons 1½ and 2½-in. wide and wound on 4-in. spools. Standard thickness is 1 mil.

Circuit Breaker (802)

An addition of a new low-cost circuit breaker, combining switching and over current protection, has been added to the Multi-breakers manufactured by the Square D Co. Aimed at the low-cost housing field, the farm, small store and shop, the new Square D unit

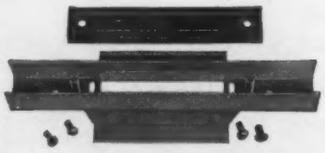
will be available in 15, 20 and 25 amp. for 115/230 volt single and two pole applications, where type D fusible switches have been used. It is compact, being 6⅛ in. high, 4 in. wide and 2⅞ in. deep, and is adapted to flush or surface mounting.

Duck Duct (803)

A new duck duct, manufactured by the Air Rectifying Equipment Co., can be installed wherever it is desired to move air by pressure or suction. Flexible and collapsible, this form of duct is vermin proof and fire resistant. Installations are made without any hammering or soldering.

Junction Box (804)

A new junction box for feeding "Plug-in" strip with any type of wiring material has been introduced by the National Electric



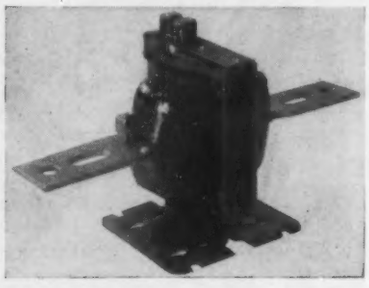
Products Corp. This No. 629 model fits on any type of standard switch box or cover, roughed into place in advance, and provides adjustment to assure proper alignment with the concealed, fiush-type strip.

Clock Hangers (805)

A popularly priced all-bakelite clock hanger has been presented by Bryant Electric Co. Molded in one piece, it permits direct mounting to the box with only two screws. Standard plate design matches appearance of "Uniline" bakelite wall plates, while brown and ivory colors harmonize with various decorative schemes.

Indoor Transformer (806)

Weighing only 8 lb. and designed strictly in accordance with Edison Electric Institute standards, two new indoor dry-type current transformers have been announced by Westinghouse. They are rated at 200 and 400 amp., 600 volts, and 600 amp., 600 volts. Design permits long range accuracy, and there is great strength against instantaneous



over-current. On the 200 and 400-amp. transformer, shown here, mechanically 250 times normal current can be safely guaranteed, while thermally the windings will stand 80 times normal current for 1 sec.

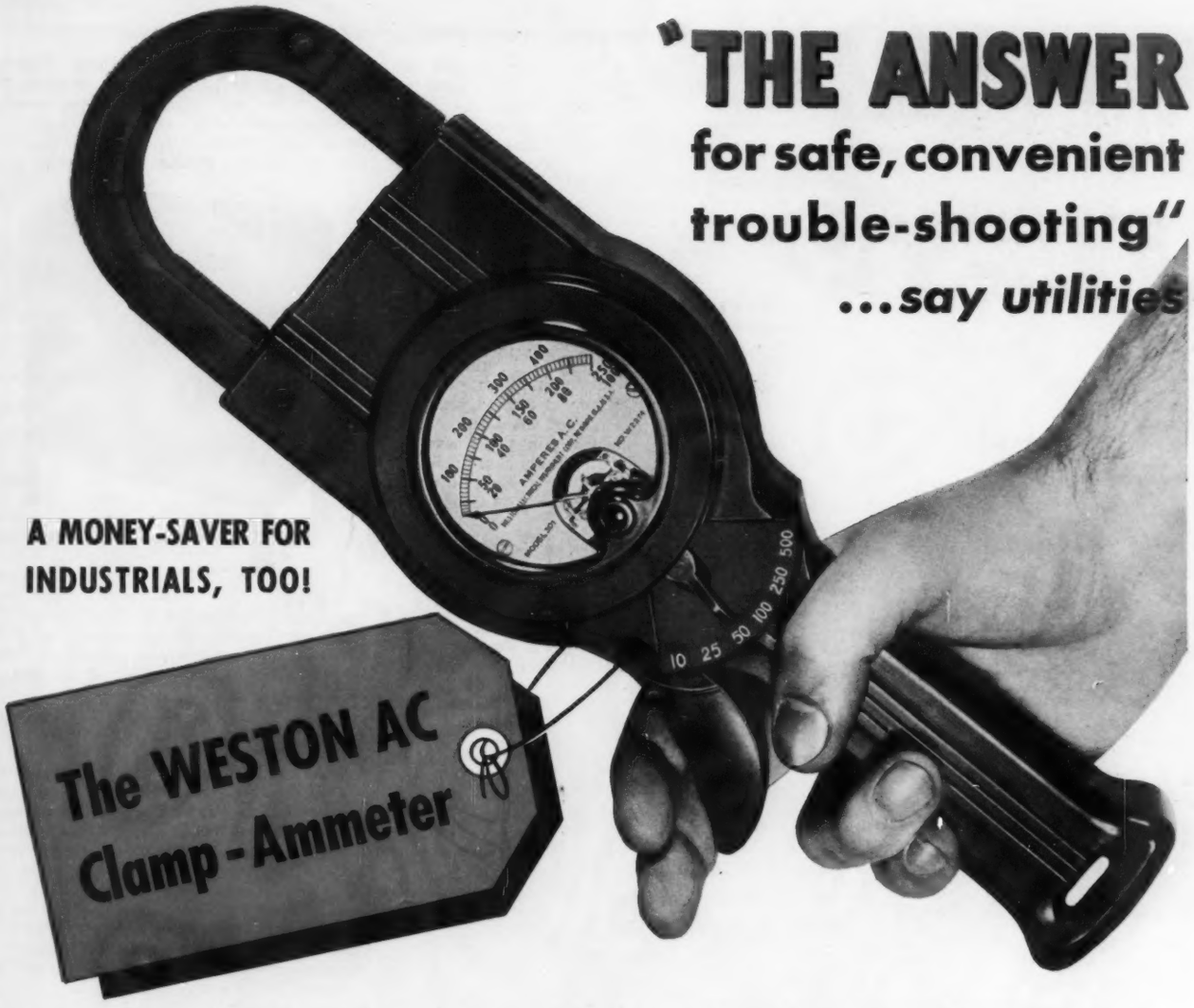
Wall Plate (807)

Made of brown Bakelite, for standard flush tumbler switches, the new Thermometer wall plate of the Arrow-Hart & Hegeman Electric Co. has an accurate thermometer recessed at the left side to show room temperature at each switch. Indications are plainly shown in etched metal supporting the thermometer tube and the red liquid clearly gives the correct room temperature reading.

Thermal Converter (808)

The Thermoverter, a new thermal converter, has been introduced by the Bristol Co. This device makes it possible to measure a.c. electrical power with any potentiometer or D'Arsonval millivoltmeter. There are no make-and-break contacts, field adjustments or moving parts in this equipment, eliminating periodic service or operating attention.

"THE ANSWER for safe, convenient trouble-shooting" ...say utilities



Here's an instrument built to utility specifications for *safety, ruggedness, accuracy and versatility.* With 6 current ranges, all changeable while the meter is in circuit, *plus* its many safety features, it provides a broader scope of usefulness for distribution problems overhead and underground.

It's a real *money saver* inside a plant, too. For Clamp-Ammeter circuit testing involves no interruptions to men or machines. The instrument is simply hooked over the conductor, bus bar or switch blade, for current readings. There are no connections to make, and circuits are never interrupted. Thus it simplifies plant maintenance... requires but little time to test and insure the efficient operation of all electrical equipment.

Complete information on the WESTON Clamp-Ammeter can be had from the WESTON representative in your vicinity, or by writing to Weston Electrical Instrument Corporation, 577 Frelinghuysen Ave., Newark, N. J.

OUTSTANDING FEATURES

6 current ranges . . . 10/25/50/100/250 and 500 amperes. Higher ranges on special order.

For insulated or non-insulated conductors up to 2" diameter.

Accuracy guaranteed within 3% between 50 and 70 cycles.

Sturdy bakelite case, handle and trigger . . . for maximum safety.

Clamping jaws heavily insulated . . . protects operator . . . prevents short circuits.

Instrument quickly detachable for remote indications.

WESTON *Instruments*

WESTERN REPRESENTATIVES

Seattle, Wash.
Eicher & Bratt,
263 Colman Bldg.

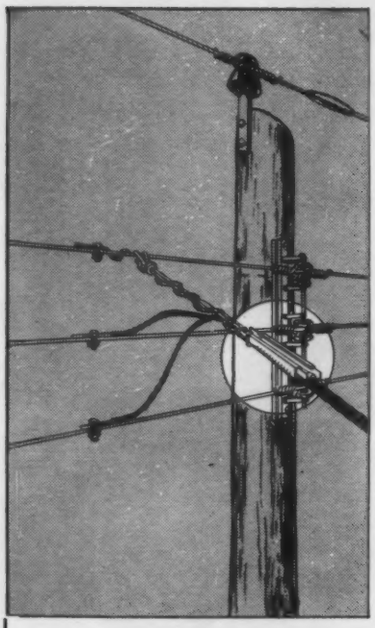
San Francisco, Calif.
Herman E. Held,
420 Market St.

Los Angeles, Calif.
A. A. Barbera,
Subway Terminal Bldg.

Denver, Colo.
J. W. Van De Grift,
623 Charles Bldg.

Phoenix, Ariz.
J. E. Redmond Co.,
448 W. Madison St.

Modernize
YOUR DISTRIBUTION PRACTICE—



Residential area construction—showing single phase primary with attachment of service cable a couple of feet from pole to high strength common neutral wire.

RELIABLE CONCENTRIC CABLE CLAMPS

hold cable securely without bending or snubbing or otherwise damaging the insulation. Non-corrosive materials—easy to install — low in cost.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
[illegible] CARROLL AVE. E. CHICAGO ILLINOIS

Disconnecting Lowering Hanger (809)

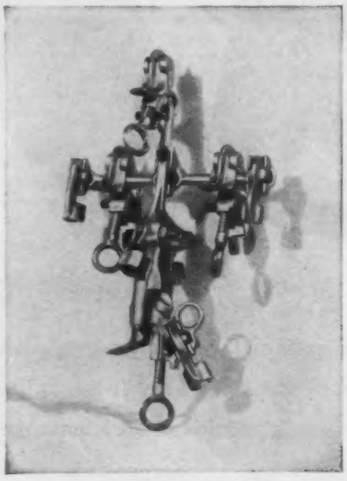
Disconnecting and lowering hangers for nearly every type of floodlight have been introduced by the Thompson Electric Co. This equipment removes the hazard of servicing floodlights. Radial and vertical adjustment of the light beam can be made from the ground, and whenever it is desired to change the beam's direction, the unit can be lowered and the adjustment made.

Electric Smoke Control (810)

An electric eye smoke control has been introduced by Photoswitch Inc., making available at low cost a method of indicating by bell or other signal located in the boiler room, when smoke passing through the furnace flue exceeds a predetermined density. Purpose: to guarantee good combustion and enable plants to keep within the limits of local smoke ordinances. Equipment includes a photo-electric control and light source, ready to install in any 110-volt A.C. circuit.

Grounding Cluster (811)

The new Tips grounding cluster, designed by A. B. Chance Co., is used primarily for grounding on four-wire construction. Clamps can be arranged to provide a single jumper or a ground for two—or three-wire systems,



also to accommodate conductors ranging in size from Nos. 6 solid to 4/0 stranded copper or 3/0 ACSR.

Flexible Guy Guard (812)

The S. E. Overton Co. has developed the Flexibal guy guard that consists of a series of bead-like, seasoned hardwood spindles strung together on the guy to the required height.. These are shaped and sanded to rounding contour, and are finished with aluminum paint. There are 14 to the set, providing a 7-ft. guard. They may be securely locked at the top by rust-resisting bolt clamps, furnished with each set of guards.

Portable Floodlight (813)

A 250-watt enclosed portable floodlight, for temporary or emergency illumination, has been announced by the General Electric Co. Easily handled, with its weight only 20 lb., the light is equipped with a galvanized steel runnion bracket with a 12 in. circular base, 10 ft. of rubber jacketed cord with plug and carrying handle.

Midget Air Conditioner (814)

Two new room air-conditioning units, one only 26 in. high, have been developed by the Carrier Corporation. With provisions for easy connections to an electric outlet, the units cool, dehumidify, circulate and filter the air. A room exhaust carries away smoke

and odors. The midget ½ "ton" unit, shown here, has been tested successfully under 80 to 95 degree temperatures and supplies cooling equivalent to that given off by 1000 lb. of melting ice.

Small-size Ironer (815)

Kelvinator Division of Nash-Kelvinator Corp. has just placed on the market a new low-price small-size electric ironer, finished in white baked enamel. Weighing only 27 lb., it can be easily carried and conveniently stored. The heavily padded roll is 18 in. long by 5 in. in diameter. The shoe is of hard metal, chrome-plated. The ironer has an easily manipulated hand lever for controlling operation, and a pressing switch mounted on the side of the mechanism housing.

Footometer (816)

The Survey Footometer with a fifth wheel internal direct drive is a modern measuring device manufactured by the Speedometer Service Co. This equipment, used by engineers, highway and farm surveyors, outdoor advertising agencies, and public utility organizations taking inventories, has a standard gear ratio of 1,000 r.p.m. to the mile, and

measures distances quickly and accurately to the nearest foot. A coil spring from the wheel hub to the running board bracket, acts like a shock absorber and holds the wheel to the road. Can be attached or transferred to any car easily. It also may be obtained with a transmission dual drive.

You're Going to TOWN!

with these *New*
TYPE "MO"
COLT MULTI-BREAKERS

Surface cover with Type "MO" Unit attached.

Box ready for installation with Grounded Neutral.

and here's why . . .

these New Type "MO" COLT MULTI-BREAKERS are the very latest thing in circuit breaker design. They are rugged in construction . . . designed for today's small home, farm and industrial requirements. They provide circuit protection that is entirely automatic . . . absolutely safe. They are inexpensive to buy . . . easy to install. Flush or surface cabinets with Grounded or Insulated Neutral. 15, 20 or 25 ampere capacities. Overall size is only 6⅛" high by 4" wide.

SEND RIGHT NOW FOR COMPLETE DESCRIPTIVE CIRCULAR

COLT ELECTRICAL PRODUCTS
MANUFACTURED BY A WORLD FAMOUS ORGANIZATION
COLT'S PATENT FIRE ARMS MFG. CO., HARTFORD, CONN.
ELECTRICAL DIVISION

★ ★

ROLLER-SMITH

Announces

***New* Catalog P-12-a on DT-1 Relays**

For the protection of motors, generators, transformers and feeders.

Type DT-1 Relays meet the need for a sturdy, speedy, reasonably priced relay for protection against overloads and shorts.

Roller-Smith developed this Relay for its own needs in switchgear equipments and it has been so well received that it has been added to the rapidly growing line of R-S relays.

CATALOG P-12-a is new and interesting. Your copy is ready. Send for it.

ROLLER-SMITH COMPANY
Electrical Measuring and Protective Apparatus

MAIN OFFICE AND WORKS:
BETHLEHEM, PA., U.S.A.

Sales Agencies in Principal Cities in U.S.A. and Canada

★ ★

LETTERS

Bouquet

DEAR SIRS:

The June issue of Electrical West has just come to our attention and we wish to take this opportunity of complimenting you on the presentation of several articles and discussions with reference to water heater and range investigations and other general rate matters.

A. W. ELLIOTT
Business Agent's Div.
Bureau of Power & Light
Los Angeles

Suggestion

DEAR SIRS:

I routed a copy of E. F. Watkins' article "Who Pays the Reparations for Price Wars?" in your June issue to our executive personnel and department managers. One of them offered this suggestion: "A reprint of that article with a letter should be sent to every executive, buyer and salesman of the manufacturers, manufacturers' agents and wholesalers in the industry. It should go to all of the contractors and industrial executives and buyers too."

How can this message be driven home in such a way that the executives and buyers will realize that their goods and services may only be sold at a profit when those with whom they do business are in a position to sell their services in a like manner?

It is refreshing to see a man whose position is that if he drove those from whom he purchased to sell at a loss, such institutions could not pay decent wages to their people, would become unsound and eventually go broke, with the result that neither the institution nor its employees would be in a position to buy from his company.

When knowledge of this economically sound fundamental principle permeates business from top to bottom we may expect to see a return of that prosperity which permits business to function in the interests of customers and employees as well.

HARRY L. HARPER
Pacific District Manager
Graybar Electric Co., Inc.
Los Angeles.

Milk Irradiation

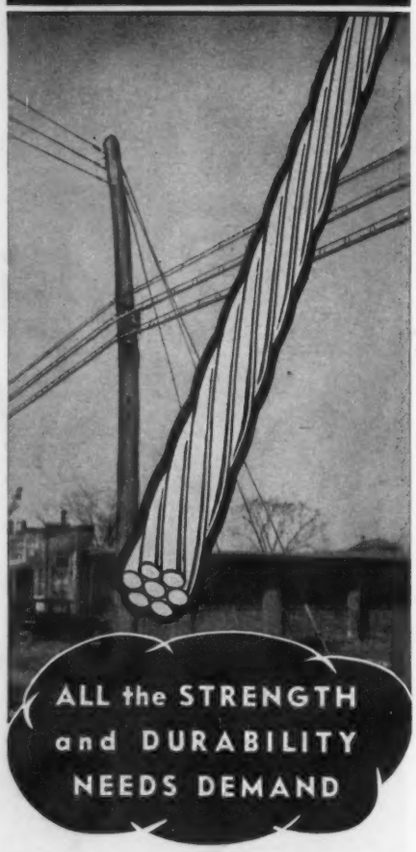
DEAR SIRS:

In the May issue of Electrical West, page 46, there appeared a statement that numerous dairies in Sacramento, Modesto, San Rafael and Los Angeles were irradiating milk with ultra violet light. I wonder if you could furnish me the names of these dairies.

BEN D. MOSES
Div. of Agricultural Engr.
Univ. of Calif.
Davis

Fluid milk is being irradiated by the Capitol Dairy Co., Sacramento, the Marin Dairy Co., San Rafael and the Adohr Creamery Co., Los Angeles. Evaporated milk is being irradiated by Borden's Milk Co., Modesto; Nestle's Milk Co., Ripon; Pet Milk Co., Salinas; Nestle's Milk Products Co., Gonzales and The Carnation Co., Gustine.—ED.

Crapo
GALVANIZED STEEL
STRAND
Guy and Messenger



ALL the STRENGTH and DURABILITY NEEDS DEMAND

The superior tensile strength that only steel can give . . . . the ruggedness to withstand severe punishment . . . . the ability to outlast normal needs . . . All these are combined—with outstanding economy—in *Crapo* Galvanized Guy and Messenger Strand.

Long life and low maintenance costs are characteristic of this time-tested product. Heavy, ductile, tightly-adherent zinc coatings, applied by the *Crapo* Process, provide lasting protection against corrosion. The inherent strength and endurance of the steel makes for dependable, maintenance-free service.

Crapo Galvanized Steel Strand is readily available in all standard grades and sizes from representative jobbers.

Crapo Galvanized Products also include *Crapo* HTC-130 and HTC-80 Steel Conductors (Solid and Stranded 3-Wire), Construction Wire, Tie Wire and Ground Wire.

INDIANA STEEL & WIRE CO.
MUNCIE INDIANA

INSTALL

GENERAL ELECTRIC HOME WIRING*

For Consumer Satisfaction

IT'S ADAPTABLE

G-E Home Wiring* is adaptable to all sizes and types of homes and other small buildings. It helps to assure electrical adequacy now and in the future.

ADEQUATE WIRING SERVES AND SAVES

*G-E Radial Wiring System.

IT PROVIDES ADEQUACY

G-E Home Wiring* is designed to meet modern needs for electricity in the home. It provides ample sized wire, plenty of outlets and the most efficient wiring layout possible. Current will always reach outlets at its rated voltage. Outlets are located wherever they may be needed. Switches are placed so that it will be possible to walk in a pathway of light. Lights will burn brightly and appliances will operate efficiently.

Install G-E Home Wiring* in every home you wire. You will be doing a favor for your customers and yourself. Your customers will obtain truly adequate wiring. You will obtain larger wiring jobs. The use of G-E wiring materials enhances your reputation for dependable work because G-E materials give lasting, satisfactory service. For a G-E Home Wiring* manual and for further information on G-E wiring materials see the nearest G-E Merchandise Distributor or write to Section CDW-977, Appliance and Merchandise Department, General Electric Company, Bridgeport, Connecticut.

GENERAL ELECTRIC

Reach out for NEW business with Wiremold

Modern Service Station Lighting with Wiremold Fluorescent

NEW business opportunities like these . . .

Rewiring
School Buildings
Office Buildings
Stores
Show Windows
Counters
Wall Cases
Hotels
Clubs
Restaurants
Factory Buildings
Homes
Prefabricated Houses

Outlet Systems
Beauty Parlors
Floor Lamp Displays
Table Lamp Displays
Portable Fans
Water Coolers

Overfloor Outlets
Telephone
Office Machines

Fluorescent Lamp Lighting
Bank Teller's Cage
Wall Cases
Inspection Tables
Assembly Benches
Color Matching
Etc., etc.

Become Lighting
HEADQUARTERS
for Your Territory . . .

at a time when better lighting is your best business building opportunity

OUTSTANDING Wiremold developments in the field of lighting offer Wiremold Contractors an exceptional opportunity to assume leadership in the very definite UPSWING in lighting business now evident throughout the country.

Wiremold has consistently led in the development of needed NEW Better Wiring Systems and equipment . . . to meet the demands of this trend.

Wiremold Fluorescent Strip, Fittings and Reflectors have already established new standards of convenience and efficiency in installing Fluorescent lighting.

NEW Wiremold Showcase Strip for Fluorescent and Lumiline lamps; Wiremold Show Window Lighting Systems and the broadened application of other Wiremold Wiring Systems such as "Pancake" and Plugmold in connection with lighting modernization for homes, stores, offices, commercial buildings and schools . . . all of these give Wiremold Contractors and utility lighting departments an unrivaled set-up for correct solution of present day better lighting problems.

Use Wiremold Engineering and Data Sheet Service Freely

All the resources of the Wiremold Company, including experienced lighting engineering assistance, are placed at your disposal to aid you in building profitable new lighting business NOW. Use these services freely.

ADEQUATE WIRING SERVES AND SAVES

GEORGE A. GRAY, 2720 - 17 th St., San Francisco, Cal.
FRANK J. AIREY CO., 1855 Industrial St., Los Angeles, Cal.
F. A. STROHECKER, 2207 First Ave., South, Seattle, Wash.

WIREMOLD *Your* BUSINESS BUILDER

THE WIREMOLD COMPANY - HARTFORD, CONN

PRODUCT DATA

Keep Posted for 1c

Your being right up-to-the-minute may have an important bearing on your success. New developments are appearing daily in your field—tools to help you do a better job. Are you abreast of them? You fall back a step when the other fellow is well informed about a subject of which you are ignorant. Manufacturers' publications are a quick, efficient way for you to keep posted on current events in your field.

Isn't it a bargain to invest 1c (the cost of a postcard) to help yourself achieve the increases in earning power to which you look forward? American industry is offering a remarkable service—free. ELECTRICAL WEST makes it easy for you to enjoy this service for your own. Check and mail the coupon below. That's all you have to do help yourself toward better performance and greater rewards.

FH Breakers (817)

"Modern FH Breakers March On in Steel," a 32-page booklet of the General Electric Co., outlining the important advantages of FH cubicles. Serving as a reminder of FH breakers' performance record during the last 40 years, the publication pictorially describes new modern units for new installations, carefully marks improvements with complete diagrams.

Industrial Gas (818)

"Shell Industrial Gas for Cutting Steel," a new bulletin issued by Shell Oil Co., Inc., discussing use of propane as fuel gas in oxy-cutting torches. Subjects include types of cutting tips for use of propane, directions for adjusting the pre-heating flame to get maximum temperature, rate of fuel consumption, and comparative costs with other fuel gases. Numerous illustrations complete the text.

Power Transformers (819)

A portfolio of "Unusual Power Transformers," issued by Allis-Chalmers, pictures a few of the many installations by the company to meet exacting requirements of utilities throughout the country. Booklet describes in detail various installations, units developed to meet modern demands for increased phase angle and load ratio-control, etc., and also shows how this heavy equipment is sent.

Service Station Lighting (820)

"Modern Lighting for Service Stations," a new bulletin released by the Goodrich Electric Co. Fully illustrated throughout its 36 pages, it is claimed to be the most comprehensive booklet ever published on this subject. A series of typical lighting layouts for stations is included, also engineering data on lighting curves with charts for proper mounting of floodlights, etc.

Lighting Fixtures (821)

Commercial lighting fixtures manufactured by the Chase Brass & Copper Co. are completely illustrated and described in catalog No. 13 issued by the company. Facts about semi-indirect lighting fixtures and semi-indirect lighting with plastic reflectors are offered. A table showing recommended lighting intensities for general illumination of commercial interiors will be of interest to lighting engineers.

Circuit Breakers (822)

Type AC circuit breakers, load centers and pole breakers are discussed in a 16-page booklet, distributed by the Frank Adam Electric Co. General information on industrial column type panelboards and cabinets is also given. Diagrams, tables and illustrations make this bulletin complete and authoritative.

Battery Guide (823)

"Battery Replacement Guide for Radio Test Instruments," a companion to the "Battery Replacement Guide for Portable Radio Receivers," both published by the Burgess Battery Co. These guides include a newly-compiled list of radio test instruments with the correct battery replacement stock numbers.

Equipment Catalog (824)

A 160-page catalog published by the Ohio Brass Co. is a complete book in itself. Covers equipment from small pintype insulators to data on grooved trolley wire. There are many illustrations, diagrams and tables.

Motor Protector (825)

"Thermoguard," a simple automatic watchman developed by Westinghouse engineers for protection against burnouts in almost any type of fractional h.p. motor, is the subject of a new booklet by the company. This service protects against motor failures caused by continuous overloads, jamming of motor drive, inability to start or run because of low voltage. Bulletin outlines various types of motors that can be protected with the Thermoguard.

Portable Ammeter (826)

"Weston Clamp-Ammeter," a 4-page illustrated folder issued by the Weston Electrical Instrument Corp., describes new portable ammeter. Placing particular stress on ease of use, accuracy and safety, the bulletin discusses in detail such features as 6 a.c. ranges, accommodation for any electrical conductor up to 2 in. in diameter and magnetic circuit.

School Floodlighting (827)

Floodlighting for Schools and Colleges is the subject of a new General Electric Co. bulletin. It offers a proved plan for building school sports, describing floodlights for all types of applications and illustrating various school installations. An insert on "How to Floodlight Football Fields" is included, giving lighting plan, type of floodlight recommended, suggested methods of mounting, wiring and adjustments.

Kitchen Ventilator (828)

A kitchen ventilator developed by the Vent-A-Hood Co. is fully described in an attractive folder that proves how easily and quickly this new type ventilator may be installed over kitchen ranges. Diagrams show method of installation. Engineers, homeowners and architects have approved this equipment...

Lamp Lowering Hangers (829)

Lamp lowering hangers, lamp shock absorbers and accessories are fully outlined and completely illustrated with diagrams and charts in a 40-page catalog published by the Thompson Electric Co. The new redesigned equipment is featured together with new developments and models.

SAVE TIME! USE THIS COUPON

To keep posted, simply circle the items in which you are interested, cut out the coupon (it can be pasted on the back of a postcard) and mail to:

ELECTRICAL WEST, 68 Post St., San Francisco, California

Please send me the following CIRCLED items:

801	802	803	804	805	806	807	808	809	810
811	812	813	814	815	816	817	818	819	820
821	822	823	824	825	826	827	828	829	

Name..... Title*.....

Company* .....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

TELESCOPE BM SYSTEM

CONNECTORS AND COUPLINGS

Cadmium Finish for Electrical Metallic Tubing

B–M Connectors and Couplings make the neatest installation. No nuts to tighten, just two squeezes with our Indenter and the fitting is securely fastened to the tubing.

B–M fittings are so much lower in price that the savings on the first job will more than pay for the Indenter required. Our tools and method of fastening the fittings to the tubing are patented, and we limit the license of our tools under these patents to the installation of our fittings only.

Listed by Underwriters

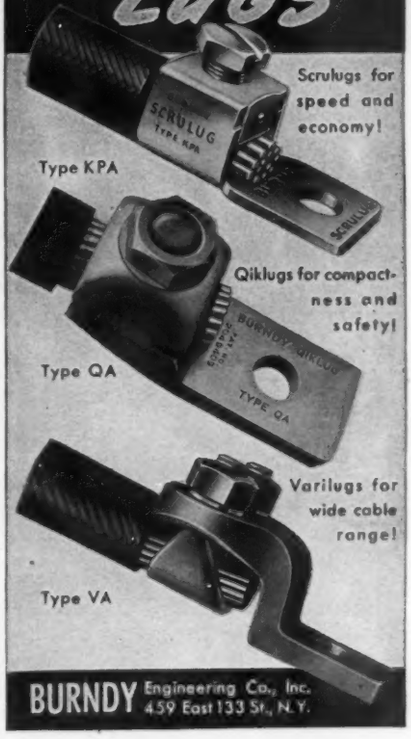
No. 605. Price $1.35

DISTRIBUTED BY:

THE M. B. AUSTIN CO., Chicago, Illinois
CLAYTON MARK & CO., Evanston, Illinois
CLIFTON CONDUIT CO., New York City
GENERAL ELECTRIC CO., Bridgeport, Conn.
THE STEELDUCT CO., Youngstown, Ohio
TRIANGLE CONDUIT & CABLE CO., Elmhurst, New York City
ENAMELED METALS CO., Pittsburgh, Pa.
NATIONAL ENAMELING & MFG. CO., Pittsburgh, Pa.

BRIEGEL METHOD TOOL CO.
GALVA, ILLINOIS

BURNDY LUGS



Scrulugs for speed and economy!

Type KPA

Qiklugs for compactness and safety!

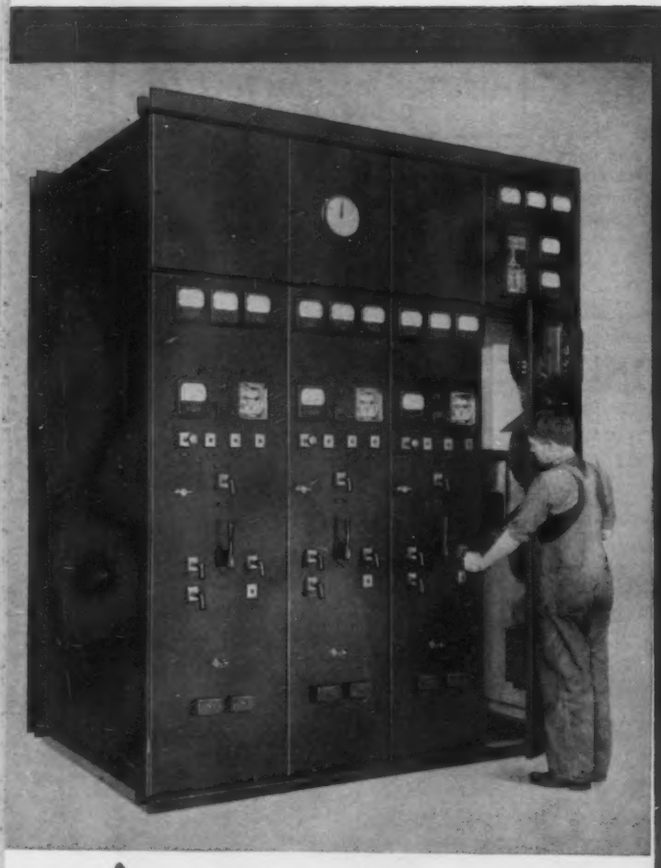
Type QA

Varilugs for wide cable range!

Type VA

BURNDY Engineering Co., Inc.
459 East 133 St., N.Y.

We Understand One Another!



PIONEERED BY ALLIS-CHALMERS IN 1924, Metal-Clad switchgear is fast becoming standard on all systems. Here is a Vertical Lift unit being inspected before shipping to a large eastern utility where it will be put into service immediately by simply connecting the leads. No special vaults or switching structures are necessary.

We've been working with many of America's utilities for a long time ... 51 years, to be exact.

Some of these utilities that had a modest output of a few thousand kw at the turn of the century, today generate many million. But they still come to Allis-Chalmers!

And it's not just a habit!

They've seen each new generation of Allis-Chalmers equipment years ahead of the field ... in design ... in engineering ... in cost-cutting efficiencies.

We understand the perfection utility engineers demand in the equipment they specify for their companies. That's why there's more to Allis-Chalmers equipment than the rating on the name plate ... more in extra value features ... more in that mechanical sturdiness that means longer life and less servicing!

Greater Value for You!

Today, even greater than ever before, new engineering features in the Allis-Chalmers line mean greater value for you and your company.

Study the equipment on these pages. See how well it fits into your present operating system!

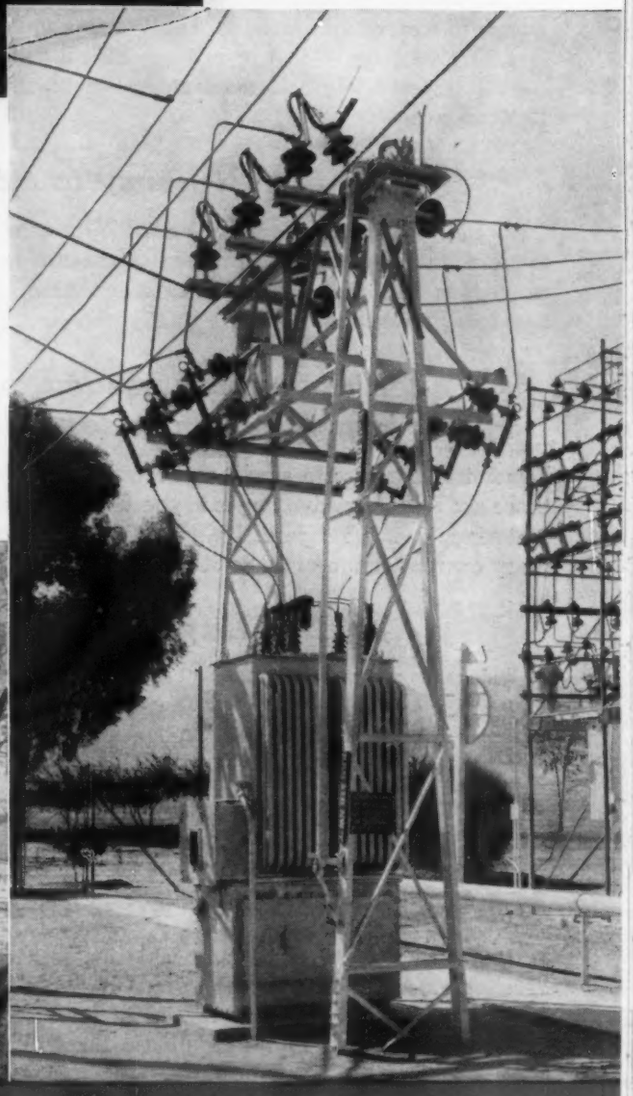
And if you want proof ... real proof ... check on an installation of Allis-Chalmers equipment near you. Find out the first-hand story of what Allis-Chalmers superior engineering is doing for that company. Then call the nearest district office ... or write direct to Allis-Chalmers, Milwaukee ... and find out what that superior engineering can do for you!

1122

CUSTOMERS KNOW that skilled engineering, precise workmanship, and exhaustive testing are their guarantee of outstanding performance with Allis-Chalmers equipment. Here is an inspector checking the low pressure cylinder blading of a 25,000 kw steam turbine.

EVERY DAY BIG SHIP-ments of distribution transformers go out from our Pittsburgh Works. The shipment shown here is being used to serve the chemical engineering building of a prominent midwestern university, where dependable service is vital.

RUGGED CONSTRUCTION that reduces maintenance to a minimum makes the Allis-Chalmers 5/8% Half-Cycling Step Feeder Voltage Regulator the utility man's favorite in isolated installations such as this one. And he's also found that the longer contact life and lower excitation current of this Allis-Chalmers development are real money-savers for him.



ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

LOS ANGELES, CAL. — ROWAN BUILDING
SEATTLE, WASH. — HENRY BUILDING
SALT LAKE CITY, UTAH — KEARNS BUILDING
SAN FRANCISCO, CAL. — RIALTO BUILDING
PORTLAND, OREGON — 1311 S. E. UNION AVE.
DENVER, COLORADO — CONTINENTAL OIL BUILDING

NEW INSTRUMENT TRANSFORMER HAS WIDE RANGE ACCURACY

for Lower Cost Metering

Quicker and easier to get high current facts

It's no longer necessary to spend a lot of time or a lot of money to meter high currents. The Westinghouse FW Instrument Transformer — in two ratings, 200/5 and 600/5 amp. — will meter safely and accurately — currents from 20 to 1200 amperes.

Easy to install—easy to move

The small, compact, ruggedly built FW is easy and simple to install in any circuit. No primary connections necessary — primary cable goes through center opening. Low cost — requires little space.

Only two sizes needed for wide range of service

Fewer transformers to stock, and fewer changes to make — those are FW's big advantages to you. Permits highly accurate metering, over a range of 10% to 200% of rating, — a primary current range of 20 to 1200 amp.

5 Big Advantages

1. Wide range accuracy — 10% of load to 200% overload.
2. One transformer handles either 2-wire or 3-wire single phase service.
3. Small, lightweight, compact, easy to install.
4. Flexible, economical, portable.
5. Safe — no primary connections and low open secondary voltage.

Men who know how want to help you

When you have a high current metering job to do, consult Westinghouse. There is a *complete* line of Westinghouse Instrument Transformers described in Booklet 2138. Write for your copy. Address Westinghouse Electric & Mfg. Company.

J-70179

THE WESTINGHOUSE FW CURRENT TRANSFORMER

A simple, low-cost, compact unit with dependable, long-life insulation. Two ratings cover primary current range from 20 to 1200 amp.

Westinghouse Transformers

ELECTRA'S HUSBAND

"Work by Wire"

"ONCE you told me that you would define electricity for me some day," Electra said after dinner one evening. "Today at club some of the women wanted to know what it was."

"I never offered to tell you what electricity was," I countered. "You must be thinking of the story I told you about Prof. Cory over at Berkeley. One day in class he put this question 'Can any of you tell me what electricity is?' One of the boys in the back row was half asleep and Prof. Cory knew it. So he directed the question specifically to him. This chap came to with a start and answered:

" 'I knew but I've forgotten.'

" 'Now isn't that a damned shame,' Prof. Cory said. 'The first man in the world to know the answer to that question and he's forgotten.' "

"Yes, but that doesn't tell me anything but that you and your classmates were dumb," Electra said.

"Here's one time when I can prove to you that conventions are of some use," I replied. "Back at the EEI meeting in New York C. M. Ripley of the General Electric Co. said that electricity is work and then went on to prove his definition. If electricity is work, he averred, a unit of it could be measured in foot-pounds. Then he showed that one kilowatt-hour was equal to 2,655,200 foot-pounds of work. So you can tell your women friends that the work is done down at the power house and is used wherever they want it in the house. When they pay their electric bill all they are doing is buying work by wire."

"That's as clear as mud," Electra interrupted. "I know what work is and it isn't foot-pounds to me. It's muscle-hours or something."

"Let me go on with Mr. Ripley's explanation," I expostulated. "He said one kind of work is climbing stairs. You'll agree to that, for I remember that you climbed to the top floor of the Telephone Building in San Francisco with your young nephew. The Telephone Building is 400 feet high and you weigh 115 pounds. That means that you expended 46,000 foot-pounds getting to the top. Well that isn't two per cent of the amount of work there is in a kilowatt-hour. You'd have to climb the Telephone Building 57 times before you equalled the amount of work of just one kilowatt-hour. And at the rates you pay, a kilowatt-hour costs you about two cents on the average."

"Next time I want to go up in that building I'll take the elevator," Electra interposed.

"You'll be smart. One kilowatt-hour costing less than two cents will carry more than 40 people like you to the top of that building."

"Another thing Mr. Ripley said was that no man can make a kilowatt-hour in a day with his muscles alone. You remember that bicycle hooked to an electric generator in the P. G. and E. exhibit on Treasure Island? The good looking chap who showed us how it worked said that no one had been able to pump it long enough to make even a tenth of a cent's worth of electricity."

"Yes, and I recall that you couldn't pedal it fast enough to keep the fan he hooked to it running to keep you cool," Electra said. "As a power plant you're just about useless."

"I could have told you that. For that matter so is any other human. Mr. Ripley told about a six-day bike race champion who made eighteen ten-thousandths of a kilowatt-hour on a similar machine during a one-minute sprint. If he and his team mate rode at the same rate during the whole six-day race, they would have made 78 cents' worth of electricity. He said that up at Schenectady they had a hand-driven generator just big enough to light a 60-watt lamp. He offered a young ex-pugilist $12 an hour just as long as he could keep the lamp burning. The fellow quit in exactly thirteen minutes. When asked why he quit and being reminded that he was getting $96 a day wages, he told Mr. Ripley that the money wasn't worth the work. If you hired two men to work eight hours a day for $5 each, it would take three weeks and cost you $100 to get one kilowatt-hour of electricity made by muscle power.

"Engineers have made a study of just how much work men do in all parts of the world. They found that this work measured in foot-pounds averaged only 28 per cent of one kilowatt-hour. It didn't make any difference what the muscular job was—rowing, sawing, shoveling, carrying a hod, pumping or pushing a wheelbarrow—not one single man could do as much work as a kilowatt-hour. For a long time it was almost an accepted fact that a man could average about one-tenth of a horsepower all day. In this survey Mr. Ripley spoke about it was proved definitely that the average power which a man can exert all day is 35 watts. That's just a little more than half the capacity of one of those Mazdas in your table lamp. The power these workers were able to maintain varied from 9 watts for one of the hod carrying jobs up to 72 watts rowing and pushing a capstan. Because a man can work at hard labor only a half or a tenth as hard most people think Mr. Ripley is convinced that electricity is two to ten times cheaper than most people believe."

"I always knew you were only a 10-watter," Electra jibed. "As a matter of fact you get tired pushing the vacuum cleaner, which is doing ten times the work you are. But kidding aside, I think Mr. Ripley has something. Now I know what electricity is—WORK BY WIRE. We couldn't hire servants enough on your salary to do all of the work that comes over the wires into this house."

"When more people realize that fact, ten times as much electricity will be used in the homes as is the case today. And when you tell your lady friends the answer to their question 'What is electricity?' you might also explain that the more of this work by wire they use, the cheaper it gets. This is what makes electricity such a bargain."

"You did learn something at that convention, didn't you?" Electra concluded. I knew that this was a good place to drop the subject.

ELECTRA and I are waiting for the circus to come to town. Why? Because this year when we take the nieces and nephew to the matinee, we won't swelter under the big top. Ringling Brothers and Barnum and Bailey Combined shows—billed always on the fascinating billboards with their animals and acrobats as "The Greatest Show on Earth"—will now be the most comfortable. The main tent is air-conditioned now from eight big specially built trailers. Electra says if you can air condition a tent you can air condition anything.

NEW CAMPAIGN MODELS Hotpoint ELECTRIC RANGES

THE EXPOSITION BIG VALUE MODEL
Compact (36" wide), full capacity. Oversize Directional Heat Oven, fully automatic with *two* units. One 5-Speed Select-A-Heat Calrod and two Hi-Speed Calrod Units. 6 Quart Thrift Cooker, sturdy work Lamp, Condiment Set and Time Chime.

EXCEPTIONAL VALUES
to tie in with
MKB *Exposition Campaign*

Give your range sales a swing upward by featuring Hotpoint's big value Campaign Model Ranges during the Modern Kitchen Bureau's Exposition Program.

During the months of September and October the MKB will sponsor a nation wide Electric Range "Exposition." It is your chance to high-spot a real sales activity. The MKB Campaign material is now available. Hotpoint's big value Range Models are now ready. • Get set to make this the biggest range selling autumn you ever enjoyed. See your Hotpoint distributor or district representative.

NEW LOW PRICES FOR VOLUME SALES

THE WORLD'S FAIR MODEL
(39" wide)
Specially priced for the fall campaign. Basic Hotpoint features: Hi-Speed, Select-a-Heat (5 Heat) Calrod Surface Units — Oversized Directional Heat Oven — All-Porcelain finish. Two drawers may be purchased as separate accessories and added in base of range by removing panel across front. Timer extra.

HOTPOINT OFFERS MEASURED HEAT

Simplifies cooking. Ends guesswork. Eliminates fuel waste.

1. Measured Heat — Only with electricity as a fuel can heat be measured so dependably. Hotpoint Select-a-Heat switches measure the heat for you.

2. Measured Ingredients — Good cooks know that ingredients should be measured for uniform results. Now Hotpoint Measured Heat adds another factor of dependability.

3. Measured Time — Electric cookery safely employs the timer clock which turns oven on and off. Now Measured Heat . . . measured ingredients . . . measured time . . . simplify cooking, end guesswork, eliminate fuel waste.

LET CALROD GUARD YOUR REPUTATION

Only Calrod sheaths are made of inconel, the most durable metal known to science for this purpose. Only Calrod is hermetically sealed with fused glass leads which prevent "breathing" (expanding and contracting of the unit). Calrod operates at full rated wattage for life. Out of 3½ million glass-sealed inconel metal Calrod coils in use, less than 1/20 of 1% have failed because of defect. Let Hotpoint Calrod help your sales — guard your reputation — keep customers happy.

Hotpoint

REFRIGERATORS · WATER HEATERS · DISHWASHER-SINK

PRINT IN BINDING

NEW FALL SALES PLAN

Speed up your fall sales with Hotpoint's "Cash-in" Sales Plan. It's designed to help you reap the benefit of the MKB Range Exposition and send your profits skyward. It includes a brilliant new plan for selling; new newspaper advertisements; window and floor displays and a striking new poster. Include this dynamic sales program in your plans for fall. It's all set ready to start working for you. Ask your distributor or Hotpoint district representative to show you the Plan Book.

EDISON GENERAL ELECTRIC APPLIANCE CO., Inc.
5612 West Taylor Street, Chicago, Illinois

DO THESE FOUR THINGS FOR BIGGER SALES—INCREASED PROFITS

1. Cash in on the Range Exposition Campaign. The MKB fall program is built to make money for you by capitalizing on the publicity and popularity of the two Fairs.
2. Feature Hotpoint's sensational Exposition and World's Fair models especially designed for this campaign. Advance 1940 styling increases their salability — helps you close orders now.
3. Speed up your fall sales. Get Hotpoint's "CASH IN" Plan Book. It tells how you can conduct a sales program that is designed to "cash in" on the MKB Exposition Campaign.
4. Use Hotpoint's measuring spoon promotion to get store traffic. Keep a constant reminder in the prospect's kitchen. It works for you at the right time — while the prospect cooks.

NEW HOTPOINT MEASURING SPOON

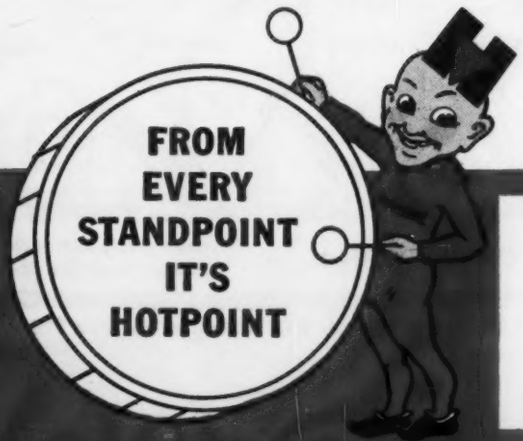
Keynote of Measured Heat Promotion—

- Build traffic in your store by taking advantage of Hotpoint's new measuring spoon promotion. It is an interest-getter that enables your salesmen to go right into Hotpoint's Measured Heat Story.

Measures from ¼ teaspoon to a tablespoon and when containing ingredients, can be laid on a table without spilling. It does a double job for you. 1. Gets prospects to listen to your range story. 2. Reminds women that Hotpoint offers Measured Heat.

ALL NEW SALES MATERIAL

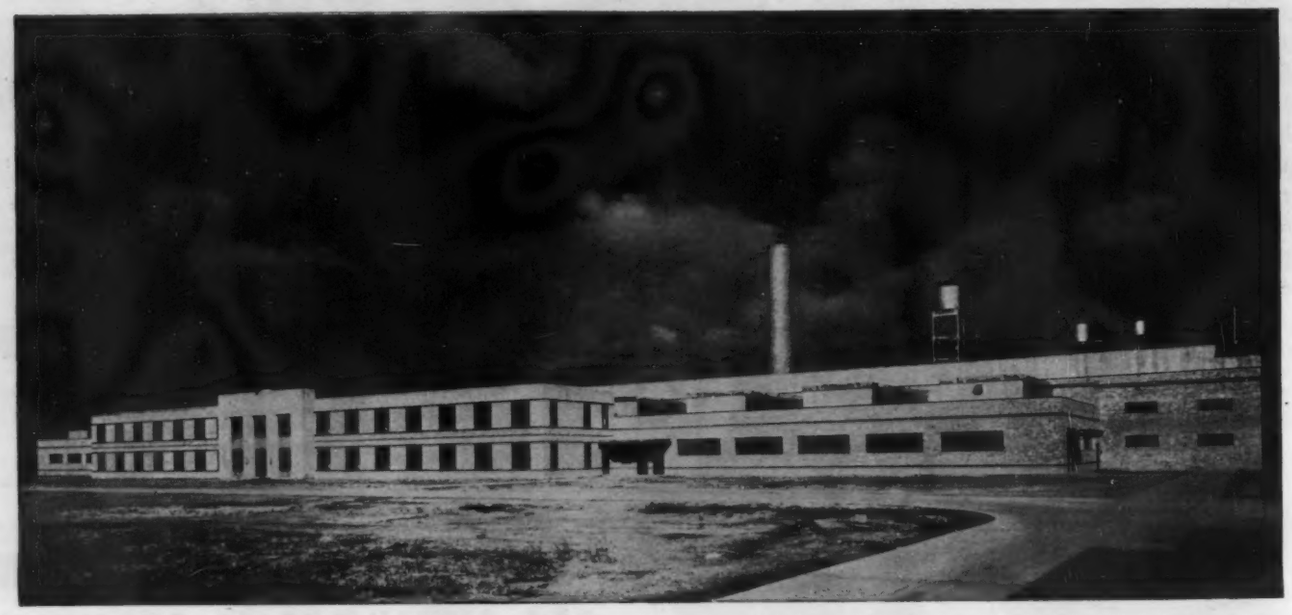
New literature—colorful sales pieces that help win prospects—plenty of space for your local sales message—window and floor displays that dramatize the product and arrest attention. New newspaper advertisements and a striking new poster. See your distributor or Hotpoint district representative.



IT MUST BE RIGHT

smooth sailing with TRIANGLE

TRIANGLE PRODUCTS GO PLACES



New Plant of **INDUSTRIAL RAYON CORPORATION** *at Painesville, Ohio*

Mr. Contractor:

14 acres of plant! — Windowless! — Air Conditioned! — Cost 11½ millions!

Materials ***had*** to measure up to the standards set by this plant!

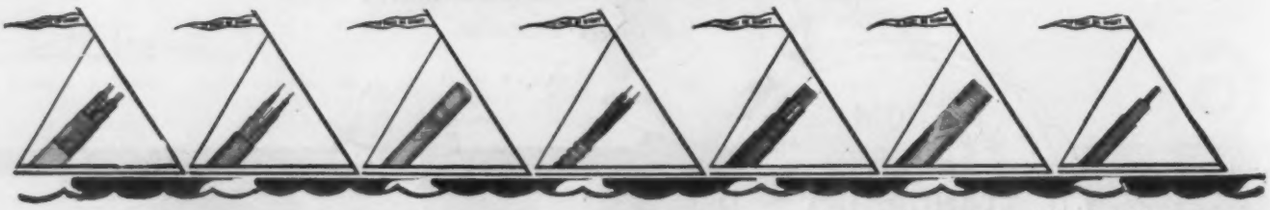
So — ***TRIANGLE materials were selected again!!!*** Black Enameled Conduit!!

Rubber Covered Wire!! Varnished Cambric Cable!!

PLAY SAFE

Mark your specifications ***"Must Be Triangle"***

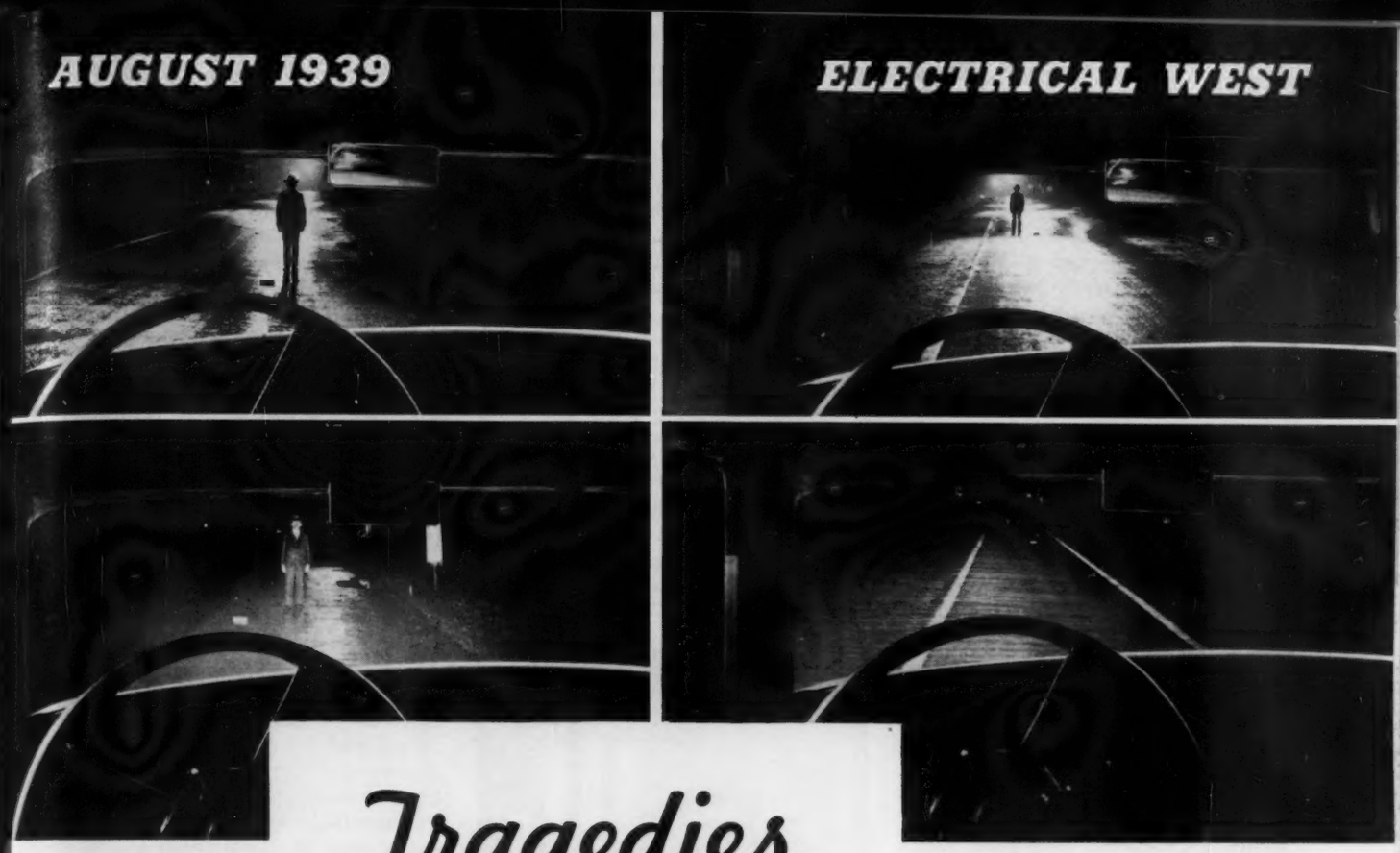
TRIANGLE PRODUCTS REWARD BUYERS!



TRIANGLE CONDUIT & CABLE COMPANY, INC.

Horace Harding and Queens Blvds.
Elmhurst, New York City, N. Y.

Pacific Coast Division: C. C. Hillis, Vice-President in Charge of Sales, 390 Seventh St., San Francisco, California



Top row—How good lighting prevents "outdriving your headlights." At left, man and brick are 100 ft. away. At right, man and brick are 200 ft. away, and when illuminated by both street lights and headlights (top) are clearly visible, but are barely so (bottom) with headlights alone

Tragedies in traffic

By W. P. Bear

STATISTICS may be boresome. Or they may be startling. Consider these: one death every 13 minutes; one accident every 30 seconds. While you are reading this article two people will have been killed and fifty injured. That is the traffic toll on American streets and highways. Therein lies a challenge to the electrical industry.

The automobile, the road, the driver, the weather and visibility are all related to each other in this matter of accidents. As a conveyance, the car is almost perfect mechanically; and, from a standpoint of safety, it is now equipped with four-wheel brakes, non-skid tires, steel top, has plenty of power with convenient facilities to apply it, good headlights, safety glass, windshield wiper. The modern road is nearly straight; it now has long radius curves, wide lanes, super-elevation at the turns and smooth, easy grades.

The driver has not changed much. He still has two capable hands, two keen eyes, two long ears, two nimble feet at the controls and is still possessed with the same mania for speed. The weather has not altered materially in the last one hundred years.

But how about visibility? With 10,000 ft.-candles of light outdoors we can see miles and miles in the daytime but when night comes on, we are within the law if we can see 200 ft. ahead of our car.

Automobile traffic accidents take a greater toll than war. In six major American wars totaling fifteen years of calendar time, a total of 244,357 American soldiers were killed or died of wounds. In fifteen years of automobile operation, a total of 441,912 deaths have occurred—nearly twice the equivalent of war-time casualty. In 1937, 39,500 persons were killed in automobile accidents. This is 4/5th the total number of Americans killed in the World War. Presumably, those killed in the war died for a purpose, but are the tragedies of those killed on the highways justified by *any* purpose?

The motor vehicle death rate in the United States is 26.8 persons per 100,000 population. We kill them from 2 to 2½ times faster than such countries as Canada, England, Scotland, France and Australia, where automobiles are quite popular. Motor vehicle accidents in the United States during 1937, in addition to the deaths, were the cause of 1,360,000 personal injuries, and an economic loss of $1,700,000,000. That is the first year the total number of injuries ever went over the million mark. The death toll during the year 1937 was equivalent to the complete destruction of a city like Waltham, Mass., or Santa Monica, Calif. The money wasted in 1937 traffic accidents would have built 35 Empire State Buildings in New York and would have constructed 250 ocean liners like the Normandie.

During the past 13 years, motor vehicle fatalities in cities over 10,000 population have increased 30 per cent. During these same years, traffic deaths in rural areas and cities under 10,000 population have increased 172 per cent.

As the sun sets, driving hazards increase. From 60 per cent to 75 per cent of all fatal motor vehicle accidents occur at night; yet, not more than one-fourth to one-third of all vehicle-miles are accounted for in these same hours. Thus the motor vehicle death rate at night, based on mileage, is three times the day rate, and based on mathematical ratios, the hazard on unlighted highways to you, and your children, and mine, is of the order of 4 to 6 times as bad at night as it is in the daytime.

Not only is the accident rate for all types of accidents higher at night, but the relative severity of night accidents

is much greater. In the daytime, only one in every 49 motor vehicle injuries prove fatal, but at night there is one death for every 26 injuries. Since 1930, motor vehicle fatalities during the hours of darkness have increased 43 per cent; at the same time, traffic safety precautions have resulted in a reduction of 5 per cent in the daytime fatalities. The entire increase in traffic deaths for 1937 over 1936 resulted from more night accidents. The fact that a large percentage of these motor vehicle deaths happened in rural districts focuses our attention on the rural night accident problem. Since 1930, these fatalities have increased 60 per cent while the daytime figures are only 15 per cent higher.

There are in the United States approximately 3,300,000 miles of roadway over which automobiles may travel. This figure includes city and village streets, also paved and unpaved country roads.

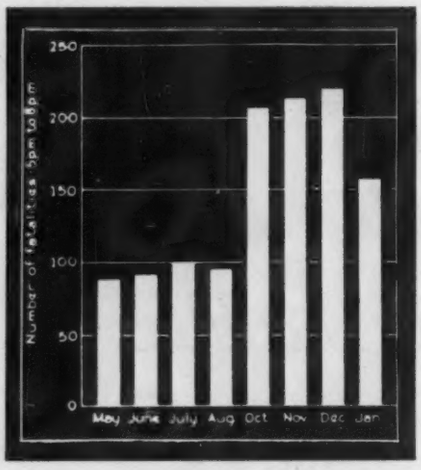
Sidney J. Williams, director of public safety of the National Safety Council concludes from a survey of traffic conditions in California, New York, North Carolina and Pennsylvania, that approximately 35 per cent of all night accidents are directly attributable to lack of illumination. This goes along with the statement issued by the Travelers' Insurance Co. who, after a survey of 46 cities, found that 49 per cent of the accidents in these cities were the result of inadequate lighting conditions. These statements are also supported by the findings of Prof. F. B. Caldwell of Ohio State University who headed an investigating committee to determine the cause of night accidents. Professor Caldwell found that 50 per cent of the night accidents were caused by inadequate visibility.

Another conclusion, equally interesting, has recently been broadcast by the National Bureau of Casualty and Surety Underwriters. They made a survey of 277 cities and found that the cities with the lowest street lighting cost per capita and with the most antiquated type of lighting equipment produced the greatest total of night fatalities. They also found that within the past 13 years, the ratio of night to day fatalities has just about doubled, that the actual number of night deaths annually has increased many hundred per cent while, in the same term of years, the day fatalities have actually been decreasing, admittedly, due to the intensive educational and enforcement campaigns which have been conducted for safety.

Following the installation and operation of more than 1,000 miles of good highway safety lighting in the states of Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, North Carolina, Illinois, Michigan, Indiana, Ohio, Washington and California, there has been collected an immense amount of information as to the effectiveness of these installations in reducing the annual toll of accidents and deaths.

The installation of adequate and proper lighting will reduce night-time accidents of the order of 40 per cent to 50 per cent. Really that is *good* but if you say *not* enough, I will say to you that you cannot expect to make a lighting job the equivalent of the sun. Even on the basis of present-day intensities the savings which have been demonstrated offset the cost of lighting in the ratio of three or four to one.

In California there is now a total of 13,913 miles of state-operated highway,



There is a definite relationship between traffic fatalities and visibility. Here are data from principal American cities comparing summer and winter fatalities occurring between 5 and 8 p.m.

about 16,000 miles of city streets, and about 65,000 miles of county roads. This makes a grand total of 95,000 miles of highway and about 10,000 miles of this total is good paved highway. It is altogether reasonable to say that the accident and death rate on at least one-tenth of the best paved roads in this state will justify the expenditures for good lighting.

In the final analysis these tragedies in traffic are directly the result of poor visibility. They may be eliminated by applying suitable lighting correction.

Occasionally we find an installation of street and highway lighting being made which is termed "an experiment." When we realize that there is now in operation in this country more than a thousand miles of highway lighting, a considerable proportion of which has been installed under the supervision of competent engineers who really know how to set up a lighting job, and, too, that we have in hand reliable information as to the potency or value of these installations to effect reduction in accidents and deaths on the highways, it seems no longer justifiable to regard street and highway installations as experimental.

Today you do not buy an automobile on the basis that you want to determine for yourself whether or not it will safely and speedily carry you to the next town or to another state or throughout the United States. Street lighting was introduced into this country before automobiles were ever thought of. It is not necessary to regard street and highway lighting as an experiment if the design is in competent hands. The fact that well-designed installations will accomplish certain specific and desirable results has already been proven.

Many years ago, engineers and analists determined the best prescription for the installation of street lighting. We know what may be expected of it if correctly installed and properly maintained and operated. It is true that highway lighting must function in a different manner to provide good seeing on rural highways; however, it is nothing more than an extension of our understanding of the technique of lighting streets for safety.

If a street and highway lighting installation is to perform the function intended or expected of it, the technical details of design, such as the height and position of light source, the spacing, the setting arrangement, the type of luminaire, and the total amount of light required, must be left to those persons who are technically competent to assemble the facts and prescribe the type of installation which should be made. The competent lighting engineer can take into consideration the width and physical characteristics of the street or highway to be lighted. He can determine the normal and peak traffic flow, the probable future increases in traffic, the reflection value of the pavement, the type and kind of light source most suitable to the task, the best method of control and operation, the most trustworthy source and cost of energy supply and many other factors which are pertinent.

When his job is finished, the lighting engineer will have contributed his quota to the reduction of these tragedies in traffic. Our industry has the manpower, the technical knowledge and the equipment to meet the challenge of death on the highways. With such an opportunity for human service in front of us, why should we wait? The full force of a united industry should be directed toward an educational program to awaken the public to the relation of the right kind of street and highway lighting to driving visibility.

WHAT the E. E. I. Proposes for the Code and WHY

A summary of its case as presented to Inspectors

ITS case for bare neutral, thin wall insulation, occupancy of raceways, and covered neutral concentric type cable assemblies for residential and small commercial building occupancies is set forth by the Edison Electric Institute in booklet form in a well documented presentation to the electrical inspectors. This book, 124 pages of text, tables and illustrations, was prepared at the request of the International Assn. of Electrical Inspectors by the Light and Power group on the National Electric Code committees. It supports the proposals first made only in outline form to the industry in an article by C. W. Kellog, president of article by C. W. Kellogg, president of

Another booklet for the trade, "Basic Factors of Adequate Wiring" is the first of three which will give the EEI reasoning in support of its promotion of the concentric type of wiring material. This material it maintains can become a means of selling more wiring, chiefly of getting more copper carrying capacity for the ordinary job.

After clarifying its motives the EEI, in the booklet "Discussion of the Revisions of the National Electrical Code Proposed by the Electric Light and Power Group", handles the subject in two groups—(1) "Use of uninsulated neutral conductors, thin wall insulations and the occupancy of raceways; measures directed at improving capacity of raceways to carry electrical energy, and intended for rewiring of existing buildings;" (2) "Covered neutral concentric assemblies for new wiring, directed at circuit and outlet adequacy."

In the first group EEI proposes that bare neutral be used in alternating current systems only, for neutrals connected to water piping systems and only in rigid conduit or electric metallic tubing. In developing its case EEI maintains that experience records and a field check investigation by Underwriters Laboratories Inc. do not bear out the objection raised that bare grounded neutrals will cause stray currents to escape from their conductors and flow through parallel circuits. This experience indicates that by-pass currents are small, not proportional to the total unbalanced load current in the neutral, lessen as the load increases, that metallic raceways exert a choking effect which limits them, and that tests show steel raceways have an "apparent impedance" much less than either their d.c. or 60 cycle a.c. resistances. Charts of tests support this contention.

Of thin wall insulation the point is made that new synthetic and rubber compounds for insulation permit of higher dielectric properties with less bulk. In view of these improvements the old tables of permissable wires in conduit, based on rigid dimensional requirements, EEI says are outdated and performance requirements should be substituted. That space advantages decrease with the larger sizes of conductor is recognized and also that larger and stiffer conductors require mechanical sufficiency of insulation. However, EEI feels that with bare neutral to balance against heavier insulations greater copper density may still be obtained in rewiring of old buildings.

As to using more of the raceway cross-section in old work, EEI holds that the spare conduit area was originally provided for future expansion, and that the time to use it is here. In attempting to sell customers on rewiring, EEI says, its companies have found customers reluctant to pay for the extensive reconstruction of their buildings necessary where new raceway is installed. As a specific proposal EEI suggests that 75% of the available cross-section area be used, as against an average of 40% occupancy under present code rules. (Some of the reasoning is contained in the June 1939 ELECTRICAL WEST, p. 157.) It recommends, however, consideration of the feasibility of pulling without mechanical damage, especially the newer materials about which the pulling behavior is not known. In new work EEI recommends that present raceway area spare space be kept as it is to allow for future increases in capacity.

Concern over heating due to I^2R losses in crowded raceways in which the copper is carrying maximum capacities, EEI dismisses with the claim that with increased copper in a conduit, the loads need not be so heavy on conductors, and thus the overall improvement will balance off the theoretical disadvantage. Ability of new insulating compounds to withstand higher temperatures is also counted on.

Concentric Cable

Second part of its case is that for the special cable assemblies developed at the request of some of its members and tested in extensive field installations, particularly in certain areas in Michigan by Detroit Edison Co. Known as CNX and other trade names, such cables have in them one or two "hot" conductors thoroughly insulated, around the outside of which is spirally wound a neutral conductor, the latter covered with braid or fiber jacket of some insulating properties but not for the full line voltage.

There is nothing new, EEI says, in non-metallic sheathed cable, or in service entrance cable having a covered neutral uninsulated. Only in concentric assembly and the covered neutral for interior wiring is there novelty. Concentric assembly, it claims, is more compact, it renders polarization practically automatic, the live conductor cannot be reached without penetrating the concentric neutral and thus shock is rendered next to impossible. Grounds, it says, are minimized because any impairment in insulation must result in a short circuit and consequent clearing of fuses.

EEI wants the code to include this material under permissible wiring methods under similar conditions to those permitting non-metallic sheathed cable, and that when installed in raceways it will be as with any other type of conductor. Principally, it maintains, the field of use will be in small non-fire resistive buildings of domestic and commercial occupancy where the difficulty at present is to get enough copper capacity, circuits and outlets. EEI discounts the fear that such cable assemblies need non-metallic boxes and outlets for safety. Field records on 6,243 installations are cited as proof. In these the number of outlets exceeds by twice those in ordinary homes of comparable size.

From a premise that any system of wiring admitted to the code is as safe as any other likewise admitted EEI asks that some of the code's restrictions on some wiring systems be revised. The question of requiring metal enclosed wiring systems in all types of theaters, regardless of size, and of similar requirements in domestic garages where more than two cars are stored, it quotes as arbitrary and not particularly reasonable in view of actual conditions. As to the proposed opening up of the rule that conduit be made and supplied in 10-ft. lengths, it merely holds that other lengths might be equally advantageous and as far as safety is concerned, fully as protective to wiring.

Let's Stop at Los Angeles

Colored light in arch and tower, bright modern pylons outdoors give the new union depot a dramatic exterior

LOS ANGELES early outgrew its railway stations, a Gay Nineties red brick Santa Fe station that became an eyesore, and the more modern but inadequate union station of Union Pacific and Southern Pacific. Years of negotiation ended five years ago in a decision to build a new union depot for all lines, take important rail trackage out of competition with dense street traffic, and restore pride to this Western terminus.

Five years of work, involving the coordination of the interests of the three roads, their architects and engineers, contractors and subcontractors and the U. S. Mail, came to a close recently with the opening of a magnificent and decidedly different union depot, in appearance a Spanish Mission, complete with patios. Paul Lebenbaum, electrical engineer, Southern Pacific, headed the electrical-mechanical committee handling these phases. Electrical contractor was Chandler Electric Co., J. E. Chandler and his superintendent, Benton Lackey spending most of their time on the project. For the railroads A. J. Barkley was superintendent of construction, S. V. Meiggs, assistant. H. E. Hayes, resident electrical engineer, F. A. Roehrig, assistant.

The electrical contract ran over $150,000, not counting the restaurant, which ran $25,000. It was not started until 45 days before opening day, without plans, because not until then was Fred Harvey decided on as restauranteur. A separate contract for railway signal systems ran a half million. Chandler had a crew working three years with a maximum of 38 men; installed 65,000 ft. of Transite Korduct, 200,000 ft. of rigid conduit, 14,800 ft. of 5-kv. and 600-volt lead cable, pulled 545,000 ft. of rubber-covered wire.

For like Los Angeles itself, this station is spread wide. To distribute its aggregate capacity of 2,880 kva. over this area power is brought in by L. A. Bureau of Power & Light at 4,800 volts from two separate substations to a main vault. Once source is preferred, with automatic transfer switch between circuits. The 4,800-volt bus is divided, one side for lighting, the other power,

(Below) Train concourse, with continuous opal glass trough lamped with 25-watt lamps on 12-in. centers. Hinged sides permit relamping. Other areas are lighted with rectangular units containing 3 200-watt prismatic lens and reflectors. These installations maintain 30 ft.-candles

(Right) Lighting of high-vaulted ticket offices, waiting rooms and main vestibule is done from special fixtures 10½ ft. wide, containing 24 or 36 12-in. Holophane controlens and 150-watt reflectors, 24 or 35 ft. from the floor deliver 25 ft.-candles illumination at the floor level

schedules requiring separate metering. From the main vault energy is distributed at the same voltage to six vaults—in the track yard, at the baggage building, under the main arcade, at the terminal interlocking tower, and near the private car tracks. The track yard vault has 1,500 kw. in transformers stepping down from 4,800- to 240-volt, 3-phase for driving auxiliary motors on car air-conditioning equipment while standing in the station. A 100-kw. transformer serves for lighting 9,500 ft. of umbrella canopies or sheds in the train yard, which is on a fill, 17 ft. above street level. Sheds are equipped with 476 150-watt reflector-refractor Holophane units, mounted flush, on 20-ft. centers. The umbrella sheds support 40 tons of conduit for various telephone, signaling, air-conditioning and lighting circuits, serving as raceways for distribution circuits in conduit.

A long tunnel, at right angles to the track and connected by ramps to the track level, connects the main station with the sheds. It is lighted with two rows of the same type of unit on 15x20-ft. centers, mounted flush in the 11-ft. ceiling, lamped at 200 watts.

Main primary distribution board is in the vault under the south ramp to the utility building. It has two oil circuit-breakers for incoming cables, eight for feeders to the five vaults.

Lighting for the main concourse, vestabule, waiting room, restaurant, clock tower, garage and patios is fed from the vault under the main arcade. The 12 large fixtures in the main concourse and waiting room represent a total load of 75 kw.

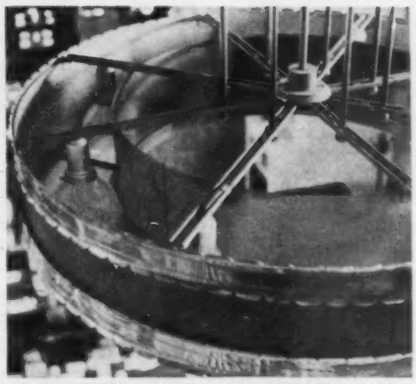
An interesting arrangement is provided for continuity of service. All lighting panels are in duplicate, fed from two sources so that failure of one will not leave the place dark. Duplicate panels were ingeniously concealed behind ornamental grill doors which also conceal the air-conditioning ducts.

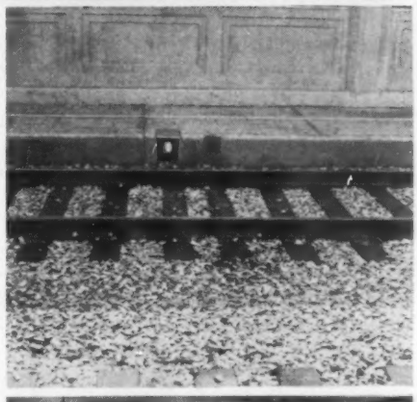
Exceptionally clear and distinct is the train announcing, thanks to an RCA public address system with horns concealed in ornamental grill-covered balconies. Accoustically treated walls prevent customary depot echos. Between trains music is played over the system for those who wait for trains. Persons may also be paged by the same means.

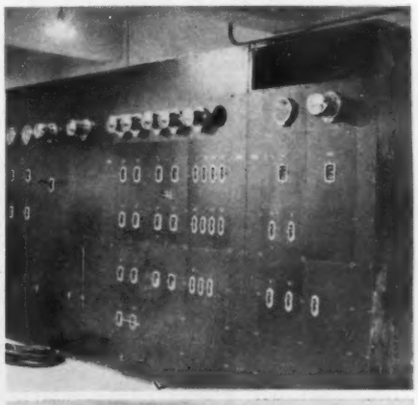
Other special lighting applications include lens plate flush-mounted units directly over the ticket takers, blackboard type units over bulletin boards, refractor equipped street lights in the taxi yard, ornamental fixtures in patios.

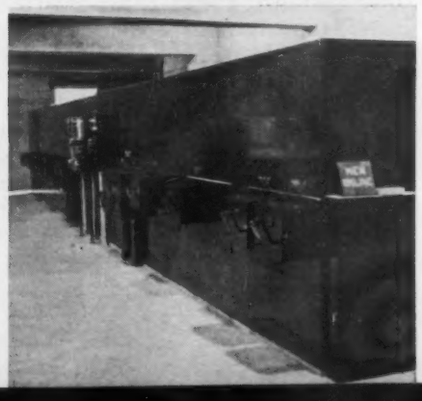
In the cocktail room pink zeon tubing fits a curved decorative ceiling. At the entrance, behind decorated sand blasted glass panels, is fluorescent light. The restaurant is air conditioned with a separate 50-ton plant. Its kitchen is equipped with a series of 9 refrigerated rooms, with different degrees of cold for storage of various kinds of foods in each.

The new depot is complete with just about everything, including a garage in which your car can be stored until you return from a trip. Next to it is being built the new "Working Post Office," the better to dispatch mail. The only ones to lose by the new and swank union depot are the Red Caps. Non-electrical still they have miles to carry your bags through the long corridors and ramps to the train.

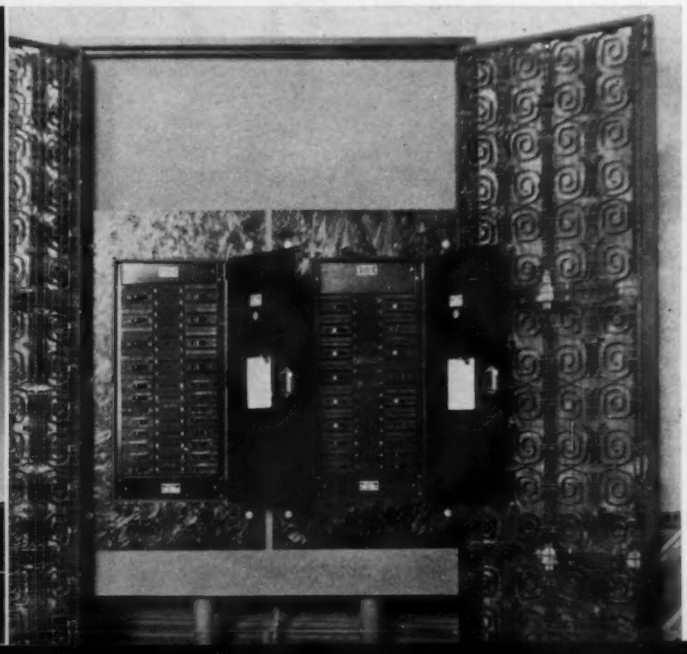








(Right, top) Inside view of fixture in dining room; lighted standard in patio. Next to tracks are arc-tite outlets for connecting standing trains to supply for air conditioning and battery charging. (Below, right) Substation switchboard, and main switchboard. (Below) Ornamental grills conceal dual lighting panels and air duct on main floor



Leakage

By R. L. BOOTH
Estimator and Engineer
Los Angeles, Calif.

WHEN a lamp burns the meter revolves. That is one form of resistance. But a leak to ground in a wiring system, even though it does not indicate its presence in the form of light, turns the meter too. Dead insulation on old wires plus a little moisture, and there is another form of resistance load that users pay for whether they realize it or not. Heat and cold changes bring condensation of moisture in conduits. Even conductors in air on fixtures I have found to leak to ground and cost users enough to pay for a new wiring installation in a short time.

On one job in the Arcade Building, by installing new wire I was able to save the tenant 71c a month in spite of adding five 200-watt fixtures, each burning 13 hr. a day, 26 days a month. The leakage previously had been costing the tenant that much and he never knew it.

The job is to locate and measure the load, check the leakage and locate causes—such as broken down insulation, solid fuses and loose screws. System-check locates many such costly sources of trouble. Each circuit should be checked to determine its actual load.

The worst cases are found in underground conduit. Such feeders often heat up under load and cool off at night and cause condensation. Others were pulled originally with water left in the pipe. I took out one set of 4/0 feeders carrying 204 amp. per leg where the insulation on the three wires was completely rotted. The 2½-in. conduit was full of water. It had been installed 16 years. The feeders indicated a leak of 7,600 watts on one leg, 8,700 watts on another without a single lamp burning. The discovery was made in Feb. 1936; in Dec. 1938 it broke down completely. That owner paid for a rewiring job many times in the wattage leakage, and eventually had to have it done anyway.

Other bad conditions are found in fixtures close to a ceiling where ventilation is poor. The wire in the conduits for about 8 in. back is often found to have nothing but powdered insulation left. A little moisture will cause the meter to turn. A bad offender is the chain fixture that has been in use for years with old type fixture wire. A leak of from two to five watts on each fixture is often found.

Outside of wattage leaks my tests have shown up such conditions as these: one set of feeders was burning up the fuse of the main switch feeding two 16 circuit panels. In checking the job I found one circuit with a ground or partial ground on one of the 220-volt legs in one panel. The 15-amp. fuse protecting this circuit did not blow. The opposite leg on the feeder was the fuse of the main line switch. It was disintegrating but not blowing.

"BOB" BOOTH

In another building I removed 19 fuses made solid by bending the metal from the screw part over and connecting it to the bottom. By actual test one of these fixed fuses took over 100 amp. before it turned blue and could have revealed to anyone its heated condition. Half of these fuses were "protecting" No. 14 wire circuits. In the same place I found three 3-wire circuits feeding a part of each large fixture in the main room with unbalanced conditions, the neutrals all tied together at the fixtures. Lamps lasted less than half the time they should.

The prize was in another building in which I found a long 10-24 machine screw holding the door of the panel, put in by carpenters, imbedded in a 4/0 wire feeding four floors, including this panel board. The main line fuse on the main board was holding. Throughout the building the management spent considerable money repairing leaks in hot water lines, and in remodeling one room a carpenter took down a wooden picture molding deeply charred by contact with the water pipe.

It is this kind of information that the electrical contractor needs and should have to sell the dollars and cents value of rewiring old buildings. It is with this inspectors should persuade owners to reinspect and remodel leaking electrical systems. I really believe that in many cases the savings in electricity alone in a year or two would pay for the changes necessary. In most cases the changes would have to be made sooner or later on account of breakdown. My investigations have convinced me there is an universal need for the rewiring of buildings.

A WPA SURVEY OF SCHOOL LIGHTING and environmental conditions in Portland is under way. Cost of the survey will be about $6,000 and covers lighting, repainting, rewiring, refixtures, new desks and blackboards. Ventilation and heating arrangements will also be studied. When the survey is completed it is anticipated that the entire project of modernizing the Portland schools will be carried as one project. A similar survey had been conducted by Northwestern Electric Co. and a recommendation made. Wiring change was not covered in the previous survey made by Earl Drew. Northwestern's survey disclosed lighting conditions to maximum of 2 to 6-foot candles, very poor quality, almost exclusively direct lighting with glare and poor glassware.

A NEW YEAR-ROUND PROGRAM to develop lighting business for electric utilities is being inaugurated by the Westinghouse Lamp Division. A series of three loose-leaf portfolios, made available to over 500 utilities, covers every phase of home, farm, industrial and commercial lighting. Promotional material, advertising and direct-mail campaigns, booklets, leaflets and dealer helps are to be included. This 1939 promotion work is not company advertising, but will carry on the Lamp Division's work of selling lighting to the public through the utilities.

AN ADEQUATE WIRING EXHIBIT was among the many electrical displays at the National Homes Show held in Salt Lake City late in June. In a booth carefully designed and installed by the Electrical League of Utah, the adequate wiring story was told by two advisors, who were on hand each evening to explain wiring advantages and needs to the public.

IN A SURVEY conducted by McCann-Erickson advertising agency, San Francisco, to determine the general popular feeling toward the Golden Gate International Exposition on Treasure Island, it was found that lighting arrangements drew the greatest percentage of favorable comments. In every one of the six cities interviewed, except Santa Barbara, "beautiful lighting" led the lists.

ORNAMENTAL TREE lighting on Euclid Ave., 200-ft. double drive in Ontario, Calif., is the nucleus of an $82,000 parks project designed to increase the fame of the city. Pepper trees standing on either side of the 63-ft. parkway which separates the two sides of the street will be illuminated by specially designed mercury-vapor lighting.

They Move to Find Light

By LaVelle Mitchener

As Told to Walter Heston

"IF properly lighted and dressed up, office space in some of the oldest buildings can be leased at attractive rentals," says Miss LaVelle Mitchener, San Francisco leasing agent. She has proved this by making more than 200 leases during the past year and by her outstanding success in leasing the newly modernized Central Tower building, formerly the old Claus Spreckles building at Third and Market Streets.

Miss Mitchener, a licensed independent agent, has done such a remarkable job in leasing space in some of the older buildings that the secret of her success was sought. She is a stickler for modernization and quite independent about it. If asked to handle an old building, she simply tells the management, "why, I can't lease that dark, dingy old space," and surprising as it may sound, she gets away with it. She insists on proper lighting and interior decoration and first-class building service. Otherwise, as she puts it, "I can't be bothered."

Secret of Her Success

What is the secret of her success? Is it because she is a super-saleslady? Not altogether that. First, she is an indefatigable worker. She is smart and probably more alert and capable than the average person engaged in this profession, but that is only part of the story. It is all in her approach to the problem. She simply does what any good advertising agency does for a client's product or service. She does a real "merchandising" job.

Her methods and experiences are cited in the hope that an outsider's views may spur the electrical industry on to greater efforts to tap the tremendous market that exists for better lighting and adequate wiring in almost every office building in the country.

To sell a wiring and lighting modernization job that may run into the tens of thousands of dollars is not an easy task. However, it can be and is being done. Some interesting figures furnished by Miss Mitchener on increased rentals as a result of modernization are shown in Table I below.

Electrical Industry Can Profit

This modernization wiring represents a tremendous potential market for the electrical industry. In the financial section of San Francisco alone, for instance, it is conservatively estimated that there is a market for a million and a half dollars in re-wiring business and other cities must present a proportionate market.

Miss Mitchener summarized it all nicely when she said: "Modernization is the trend of the day and it is only natural to expect a high rate of obsolescence in a rapidly changing science such as lighting. In the comparatively short time that we have traveled in automobiles we have had to re-build our highways several times. For a number of years the life of a radio was only a year and I hate to think of what will happen with television receivers. Automobile manufacturers spend millions of dollars every year or so for new tools and dies in order to keep ahead of obsolescence and to meet competition.

"Office buildings too, become outmoded and just at this time they are faced with a serious modernization problem. Elevators are out of date, lighting is insufficient, original wiring did not contemplate present day uses, interior decoration is out of style and in many cases buildings need a face-lifting besides.

More Modern Quarters

"Capital seems very reluctant to invest in new buildings at this time, so the older buildings do not have the new building competition to contend with. However, they are faced with an equally serious situation — the very definite trend of the office renting public toward more modern quarters. I have had office building managers say to me, 'Of course we would be glad to modernize our space and give tenants more light, but they will not pay the rent.' I can not subscribe to this view. My experience in making more than 200 leases during the past year is diametrically opposite. I find that tenants will pay higher rents if you give them what they want. It will be interesting to you of the electrical industry to know that lighting and adequacy of electrical facilities is the second most important consideration of prospective tenants. A high standard of lighting means that all of the space in an office can be utilized. This helps to offset higher rentals because there is no dark, unusable space.

Need for Good Lighting

"Many buildings could hold their tenants if they really tried but they aren't trying. They won't make repairs and modernize to offer facilities an up-to-date office wants until they have lost quite a few tenants. Then they have to modernize for new tenants or stay empty. I find office people well aware of the need for lighting. After I arrange new quarters for them they thank me for moving them.

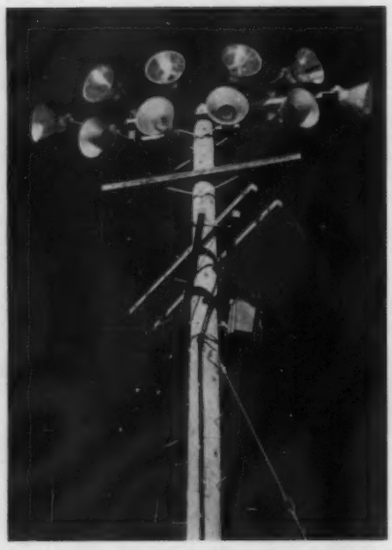
"I was gratified to learn that your industry had cooperative movements to do something about this lighting and wiring and I cannot commend your efforts too highly. Your efforts will salvage a lot of property and make it profitable again. I should think that any wide awake building management would welcome such advice and help."

Table I—Increased Modernization Rentals

	Loft Building	Office Building	Office Building
Area	60,000 sq.ft.	89,000 sq.ft.	40,000 sq.ft.
Rent per sq.ft. before modernization	3½c average	11c average	11c average
Rent per sq.ft. after modernization	7c average	19c average	20c average
Per cent increase	100	73	82
Increase in valuation of property as result of modernization	$100,000		
Total cost of modernization	$40,000	$300,000	$75,000
Cost of modernization per sq.ft.	67c	$3.27	$1.88

Difficult to light is a curved low ceilinged room. O. O. Carpenter, Pacific Power & Light Co., did it for Yakima's Fifth Avenue Market meat department (left) by installing nine 150-watt flush mounting, concentrating beam units in the ceiling. At right, San Francisco's Empire Hotel Sky Room keeps lighting reflections from its view windows at night by mounting orchid-screened units recessed in the air-conditioning ceiling duct, thanks to Gilbert Trosper

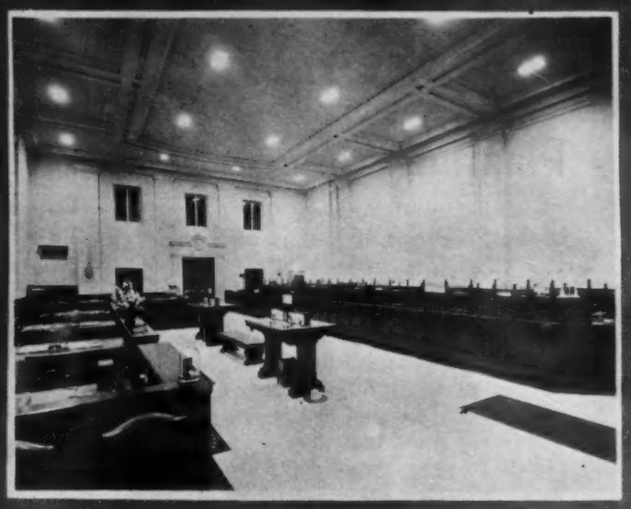
— LIGHT



Ten 1,000-watt S & M units on 95-ft. and 70-ft. poles on either side of Hansen Dam, on 650-ft. centers, a total of over 300 floodlights, permitted contractors to work nights in excavating this reservoir in record time. Some towers portable

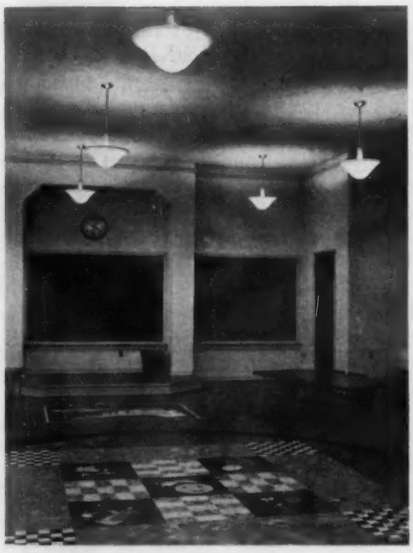
Surrealist "Window of the Future" in Palace of Fine Arts, Golden Gate Fair, designed by Eleanor LaMaire, uses spotlights and lamps with color glass on adjustable mounts for dramatic, colorful effects

When Henderson's Delicatessen and Liquor Store, on West Adams, Los Angeles, remodeled, George F. Aue, L. A. Bureau P. & L., and the contractor designed exceptional lighting. Windows have ten 200-watt Pittsburgh units on 16-in. centers, recessed in the ceiling. Three signs employ silhouette and neon letters and backgrounds. Interior is distinguished by a wall curtain in front of liquor counter concealing 20 asymetric reflectors on 24-in. centers, 100 watts each, wired so half or all (60 ft.-candles) can be used. In niches are 60-watt lumilines



LIGHT —

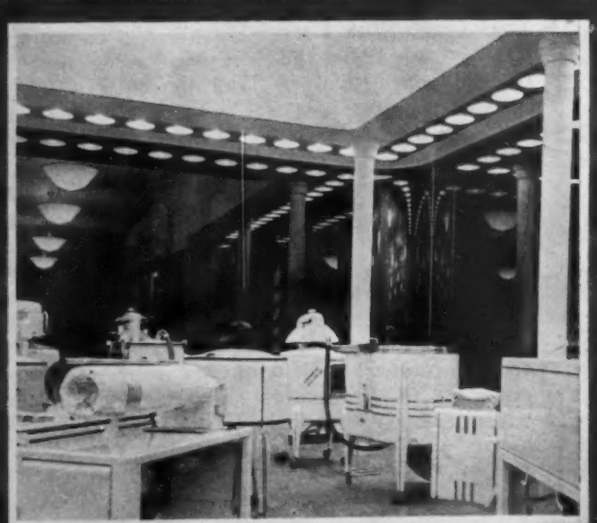
Morris Plan Bank in San Francisco used to have eight 100-watt lamps in eight ornamental fixtures and had only 4 ft.-candles at desk level. Earl Marsh, PG and E, and F. J. Klimm Co., contractors, increased the load 6 kw. by installing 20 flush-mounted 300-watt Holophane units, two to a mounting, and increased foot-candle intensity to 23 at desk level, without glare and improved the appearance of the interior as well. New wiring was done, too



Nevada's finest school is at Sparks. At left is its pretty kindergarten. Classrooms have six 300-watt units, producing 15 ft.-candles at night. Pittsburgh Electric did the wiring; Fred Steiner Sierra Pacific, the design

Highest intensity for this Associated Tires exhibit at the Fair is concentrated by contractor T. L. Rosenberg upon the sign and murals above. Five 500-watt and 30 300-watt Wuelker Flexodomes light it; 14 200-watt built-in domes light the floor section

Oceanside's new office of San Diego Consolidated Gas & Electric Co. provides the working staff with 100 ft.-candles on desks, 50 from 16 Wakefield plastic, 1,000-watt units, 50 more from 28 200-watt Curtis louvered direct units built into the ceiling. The display floor enjoys 50 ft.-candles or better. Illuminating engineer A. I. Benedict designed it. Berg Electric Co. installed it. Windows get 150 ft.-candles from a row of 200-watt Holophane reflectors and lenses on 1-ft. centers. A silhouette sign outside, lens units under markee, equally fine lighting throughout



Planning Service

Idaho Power furnishes it on kitchens and wiring

When you build or remodel a house in Idaho Power Co.'s territory, you get all the personal service the company can give. And that is, in all cases, plenty.

Just as soon as the company learns that someone is going to build or remodel, wheels begin to turn and pretty soon a complete set of specifications and plans showing how the house should be wired—adequately—is presented to the builder.

Inaugurated last year in an effort to stimulate greater interest in adequate wiring, the plan is modeled along the lines of a kitchen planning service started a few months previously. This kitchen service is itself adapted from the program of the Modern Kitchen Bureau. Heading up the operations of both services is Carl Baldridge, who also serves as secretary of the Idaho Adequate Wiring Assn.

The machinery of the service is now operating smoothly.

The salesman who first contacts the prospective homebuilder ascertains the specifications of the house and tries to get hold of an architect's blueprint. This information is then combined with electrical specifications common to all houses, and the company turns out a loose-leaf folder bearing the prospect's name and designed to help him get the most out of electricity.

Fly-leaf of the folder is given over to a brief description of the "three essentials of adequate wiring: (1) Enough outlets and switches for convenience, (2) large enough wire for economy, (3) competent, trained wiremen for safety." At the foot of the page space is left for the builder's name.

Two mimeographed pages then follow under the head of "Don't Handicap Your Home With Poor Wiring." The text further explains the three essentials listed on the fly-leaf. A large part of the space is also given over to the need of employing a trained contractor to do the wiring.

Next comes a table, which is filled in specially for each builder, under the head, "Schedule of Outlets and Switches to Be Installed in Accordance With Specifications for (Name) Residence." Listed are ceiling and bracket outlets, 2-, 3- and 4-way switches, convenience outlets, radio outlets, special circuits with the number and size of wires necessary, etc.

THE PATHWAY OF POWER
Three Essentials of Adequate Wiring
1 Enough Outlets and Switches for CONVENIENCE
2 Large Enough Wire for ECONOMY
Some of the Electricity paid for is wasted, forcing its way to the point of use, if the wires are too small. The additional cost of the right size wire is economy.
3 Competent, Trained Wiremen for SAFETY
Certified Electrician
ADEQUATE WIRING PLANS
for
DRAWN BY
103

Flyleaf of the folder of plans and ideas given the prospect

Blueprints showing the location of outlets and switches succeed this schedule. These, of course, cover every floor of the house. And lest the homebuilder have trouble understanding the symbols used, one mimeographed page immediately following explains them all.

Four pages of electrical specifications come after the table of symbols. And closing the leaflet are four more pages giving a "brief outline of items constituting adequate wiring in your planned home." Here the power company tells why it has recommended certain switches and outlets. For example, under the heading "Recreation Room," this explanation is made:

"Recreation is defined in the Standard dictionary "to be recreated." In no other country can be found the same attitude towards recreation. The so-called recreation room in the modern home is of comparatively recent origin.

"In these fast-moving, intensively active times a relaxation period for each day is considered necessary if one is to keep fit for the daily grind. The home where this is recognized and carried out usually contains a happy family and one which friends want to visit frequently.

"(1) Many electrical appliances fit into the scheme of recreation and relaxation. (2) Convenience outlets, floor lamps, etc., are of prime importance. (3) Outlets for every 8 ft. of continuous wall space is considered standard."

Baldridge's assistants, Ray Severine and Roy C. Whipple, have so perfected their technique of consolidating and digesting facts pertaining to a particular house that they can now turn out a complete folder in about two hours. And the recommendations contained in this folder are hard to beat.

The procedure followed in the kitchen planning service is similar. Only place it shows much difference is in the plans. Instead of blueprints, colored drawings are included. These give a floor plan for the kitchen and also a perspective view.

Together, the adequate-wiring folder and the kitchen folder form a complete presentation, enabling the customer to visualize what electricity will do for him and giving him the pleasant feeling that the power company is interested in his problems.

Whether this plan is actually producing results is hard to prove. But there can be no doubt about one thing: Electrical homes are becoming more popular in Idaho Power's territory. The personal plan books and specifications must have a lot to do with this.

Light for Apprentices

Right to the root of things goes the Pacific Coast Electrical Bureau, Northern California Division, in apprentice training classes on lighting that Clark Baker is conducting for painter and electrical apprentices; with printers coming next. Master Painters Assn. of Alameda County, painters union and vocational department of Berkeley schools have asked for a six lesson course, one night a month, this fall. Electrical apprentices at Samuel Gompers Trade School, San Francisco, will have two classes for the 90 third and fourth year men attending.

WORK OF THE SIGHT CONSERVATION council of Northern California has resulted in a request from Fresno's school board for a survey of lighting in elementary schools, conducted by San Joaquin Power Division, P. G. and E. Conditions found warrant extensive relighting. That is part of a school rehabilitation program.

DISPLAY CLINIC, held by Southern California Display Club, July 17, had as one of its "doctors" Alston Rodgers, chairman of the commercial and Industrial Lighting Committee, of the Electrical Development League of Southern California. Illuminating engineer for Incandescent Lamp Div., General Electric Co., Rodgers spoke on "Modern Display Lighting."

SUNSHINE HOUSE, built cooperatively by the building trades associations, unions and material suppliers of San Francisco ill open to the public at Treasure Island home show at Golden Gate Fair in August. Wired to modified Red Seal standards, with Better Light-Better Sight lighting, R. T. Stephens, P. G. and E. was coordinator.

Lambrequins

Lighting from natural direction at windows

Lambrequin lighting or light from the window tops is the latest approach to solving and simplifying the general lighting in living room, dining room, sunroom, library or even bedroom. Corner windows lend themselves especially well to this lighting treatment. Such light will be adequate for reading close to the window if the distance from floor, color of walls, ceiling and draperies and the wattage of lamp bulbs is carefully considered.

The lambrequin unit is simply a method of using a tubular lamp bulb behind the board over a window that conceals the drapery mechanism. Using the new fluorescent lamp bulb, this lighting may be accomplished with low wattage and from a cool bulb.

Dimensions to be used allow for simple construction. The wiring, bulb, and auxiliary unit are attached to the inside and top of the lambrequin board. The lambrequin is made up to fit the window measurements and lamp bulbs of 18″, or 36″, using 10 watts to the foot, are used either singularly or in groups to form a continuous light source inside the lambrequin. Lumiline lamps may also be used.

As the lambrequin is open at the top and bottom, a soft light falls below to highlight the drapery and more light goes to the ceiling to be reflected throughout the room. This lighting is very natural in that it directs the light from the windows which is the daytime source of light.

The accompanying picture shows a corner of the living room of Kinsey Robinson's new home in Spokane, Washington. Lambrequins are used over the two corner windows located on either side of the fireplace. I.E.S. lamps are used to balance this lighting on the opposite side of the room. Lambrequins are also used over the big corner windows in the library and dining room.

Lambrequin lighting is attracting more attention from home builders and owners than any other lighting feature, and many installations have been completed throughout the Inland Empire. The wiring and lighting for the Robinson home was planned by Mary Dysart and Ladner V. Ross.

MONDAY NIGHT is Electrical Industry night at the matchless all-electric home in Los Angeles, being sponsored by the Electrical Development League of Southern California and the Los Angeles Bureau of Power & Light.

Lumiline or fluorescent lamps concealed by the lambrequins around drapes

Art Treasures

Lighted to show their great worth, at the Fair

THIRTY to 50 million dollars worth of rare foreign old masters and modern American young aspirants in painting and sculpture deserve lighting carefully planned to bring out the finest qualities in them. To the late Leo Gianini, illuminating engineer, Incandescent Lamp Division, General Electric Co., was given the design of the lighting for the Palace of Fine and Liberal Arts at the Golden Gate International Exposition. The cover of this number of ELECTRICAL WEST illustrates the simple yet efficient method he employed in this temporary art palace adapted from what will someday be an airport hangar.

Gianini's object was to provide illumination of daylight quality, from glare-free sources and to concentrate the lighting to those portions of the wall where paintings were hung or floor where statuary was placed.

Lighting units weer made from his designs. They consist of a reflector strip in which lamp and reflector units are mounted on 12-in. centers, 12 in. wide and 14 in. deep. A wire gutter at the top mounts flush the sockets with shade holders in place. Standard PS type 150-watt inside frost lamps are housed in an Alzac reflector which has a spherical section near the base of the lamp and a parabolic section at the rim. Inside this rim a single ring louvre, 5-in. in diameter, 2-in, deep is positioned over the tip of the lamp.

Daylight quality is obtained by means of an external color filter made of double thicknesses of selected light blue glass cut in strips 2 in. wide and mounted in a staggered arrangement in a square metal frame. A 12-in. Holophane control lens is positioned 1 in. outside the color filter. The filter absorbs about 50% of the light output.

For lighting corners of the rooms or to provide additional illumination for statuary sections of the reflector strip are added; in the corners on a diagonal.

In the 59 rooms 4,000 ft. of this strip is used, lighted. An additional 3,000 ft. is inactive. Strip cost about $5.50 per lineal ft. installed including lamp in place. The $65,000 lighting and wiring installation was made by Victor Lemoge.

Other lighting techniques are used in the decorative arts exhibits and special displays, many employing fluorescent and reflector spot lamps.

Tragedy

In an unexplainable tragedy, Leo G. Gianini, 40, brilliant and promising illuminating engineer for Incandescent Lamp Dept., General Electric Co., San Francisco, took his own and the life of his mother, July 1. Nervous breakdown was given as the cause by his brother.

Leo Gianini was on the eve of receiving his doctor's degree from Stanford, the university from which he graduated a straight A student in all subjects in 1921. He then became instructor in descriptive geometry, and still later initiated what has become that institution's illuminating engineering course, the first of its kind.

After teaching at Stanford young Gianini became quality engineer for the Oakland lamp works of GE, took a course at Harrison, N. J., then joined the San Francisco division of Edison Lamp Works in 1925. In 1927 he started lecturing on illumination at Stanford, helped organize a course for which he has continued to lecture occasionally.

Engineer, among many other jobs, for the spectacular lighting for the NELA convention in San Francisco 1930, the tradition-breaking scheme for Sweet's Ballroom in Oakland, his latest achievement was the lighting of the Palace of Fine Arts at the Fair.

Considered his company's most promising brilliant young engineer, loss of him is felt deeply, as well as by associates and acquaintances throughout the industry. He was to have been prominent in arrangements at the forthcoming IES convention.

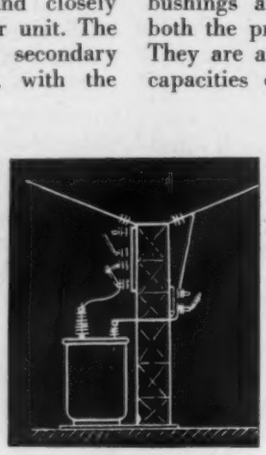
How Package Subs Are Used

A few years ago manufacturers marketed what is commonly referred to as the unit substation, which in a single housing, factory-assembled, combines all the functions of the substation composed of individual units. It is suspected that certain developments within the past decade had more to do with the birth of the unit substation than any well-defined demand for it on the part of the operating companies. I refer to tap-changing-under-load transformers, a tendency to house the live parts against external hazards or accidental contact.

The limited space encountered in underground vault installations, undoubtedly, contributed greatly to the development of compact, metal-inclosed units.

Last year John Bankus presented to this Section a "Discussion of the Unit Type Substation",* wherein he described the important features of the unit, its advantages and disadvantages, and in general its application. It is hoped the reader will find occasion to review this paper, because much of its detail will not be repeated here.

There are two general types of unit substation offered by the manufacturers. One, prior in development, consists of a 3-phase transformer equipped with a step-voltage regulator and its control apparatus housed within or attached to a conventional transformer case. The primary and secondary buses, supply lines and feeder control equipment, are housed in the conventional metal cubicles and closely connected to the transformer unit. The amount of primary and secondary switching is optional and, with the exception of the voltage-regulating transformer, offers a certain amount of flexibility.



These units appear at their best when arranged for underground cable connections and have been used principally with the primary distribution networks in the more uniform, heavily loaded commercial underground districts, or the medium-load-density, thickly populated residential areas.

Under these conditions the multi-feeder units appear usually in the lower voltage classifications and in standard capacities of 1,500 kva., but can be had in other capacities.

More recently, the single-circuit unit substation was placed on the market and furnishes the subject for this paper. Designating it as a "Package Substation" was deliberate, connoting that a piece of equipment, stock-built to widely accepted standards, and in quantities, was awaiting the purchaser at the warehouse or factory and could be shipped complete, ready to install and deliver service on short notice.

Its application would be taken for granted in much the same way as the standard distribution transformer. We need not stretch our imagination to see that this may come to pass, and with increased use and standardization, find prices considerably lowered.

We have, in a single weatherproof housing, ready for connection to the distribution system, a combination of parts that will transform, regulate, control and meter the feeder circuit in exactly the same manner as though the parts were separately housed. In fact, for the most part, the manufacturer has used parts previously made standard to function independently.

Since their major service would be in outdoor installations, these units are provided with through-the-cover bushings and lightning protection on both the primary and secondary sides. They are available as 3-phase units in capacities of 600 to 3,000 kva., and in primary voltages up to and including 66 kv. Regulation, of course, is obtained by the step-voltage principle. They are usually designed to control only one outgoing feeder, but can be furnished in special cases with two independent circuit breakers, each automatically reclosing. No provision is made for separately isolating any of the parts for inspection or maintenance, and this will mean the removal of the entire unit from service by external disconnecting devices. The manufacturers assure us no phase displacement problems will exist. Although the usual connections employed in units built to date are, high voltage delta and low voltage 4-wire Y, they can be built in specific cases Y-Y with delta tertiary or Y zigzag with delta tertiary.

Contrary to common impression, package substations, because of size and weight, offer transportation problems not met with in moving separate pieces of equipment. Even in the small capacities, special hauling equipment is necessary, requiring permits to enter upon the state and county highways. Many substation locations would require road improvement and strengthening of wooden bridges before a package unit could be placed on the site.

Distribution Systems

We may have to admit that the design of the substation in the past reflected the requirements of the distribution system which it served. The distribution systems once established are usually more difficult to modernize than the substation. The transition from the short, low-voltage radial feeders to the next level above, after all the possibilities of feeder regulation have been exhausted, has always been a major problem, and the solution has sometimes followed the line of least expenditure for the time being, by the installation of boosters or step-up transformer banks in the longer branches. These problems are usually more pronounced in the suburban areas, and the solution points toward the use of higher voltages. In the more congested urban areas, such primary voltages as 2,300 volts delta or 2,300-4,000 volts Y appear to good advantage and can be converted to the primary networks referred to.

Inflexibility of the package substation will not permit piece-meal installation and provision for future transformer reconnections to higher-voltage levels. The solution of the problem in any area must be approached from the standpoint of the possible load requirements many years in advance, and those voltages and connections which have proved best must be adapted. It is inconceivable that any package substation would be purchased unless it would fit into a well-defined, long-range program, thus reducing the

* Electrical West, June 1938.

ENGINEERING

By A. Shipek

moving of equipment to a minimum, or avoiding living with uneconomical voltage levels.

We may say then, that if package substations are to meet with any degree of success in application, they will to a great extent set the style of the distribution system. This does not mean that they could not serve the same system with existing substations, but it does point to standardization of voltages and transformer connections. Any well-laid-out system need not include more than two primary voltage levels; one urban and one suburban.

The growth of a distribution system is constantly releasing transformer and regulator capacity which must be absorbed elsewhere. This condition need not hinder the consideration of the larger multi-feeder units, but it will severely handicap the application of the smaller ones.

Restoration of Service

Automatic restoration of service following an interruption is now considered requisite to a good distribution system. It can be accomplished by small, pole-type oil circuit breakers or reclosing fuse mechanisms but in the more important cases of back-up this becomes a function of the substation. It is not surprising to note a tendency to limit the area subjected to an interruption, and, since feeders usually radiate from a substation in more than one direction, to find reclosing equipment installed in each feeder even though the kva. capacity, so controlled, may be relatively small. Likewise, the load characteristics of some circuits make it inadvisable to subject them to the outages of others.

In view of this requirement, as emphasized by the answers to a questionnaire, it is a distinct advantage for the package substation to be available with at least two circuit breakers. It is common practice now to install protective devices on the less important branches, usually single-phase, thus relieving the substation of many interruptions. I believe the advocates of the package substations will advance the argument, in connection with this problem, that there is a tendency to divide the area served into smaller units and to serve each one separately by an independent substation, but this reasoning can hardly be applied to units already as low as 600-kva. capacity, because of the excessively high cost per kva. of these smaller installations, even though some savings may be realized on the distribution conductors.

Maintenance and Inspection

As quality of service is looked upon today, that portion of an area served by any substation which can be dropped to permit inspection and servicing of the control or regulating equipment is exceedingly small. I believe we are all agreed that substations requiring periodic inspection must be provided with a means for bypassing and isolating the piece of equipment worked upon.

Interruptions to service by failure of the transformer banks, though serious, are rather infrequent. Manufacturers of transformers pride themselves on building trouble-proof units. Though the operating company may be willing to accept this hazard as regards the transformer part of a package substation, its faith in the trouble-free performance of the other component parts may not be as great.

Since the package substation must be isolated as a unit, some other means for carrying the load would have to be provided. I believe that, if advantages will result from the application of the package substation for other reasons, some compromise, rela-

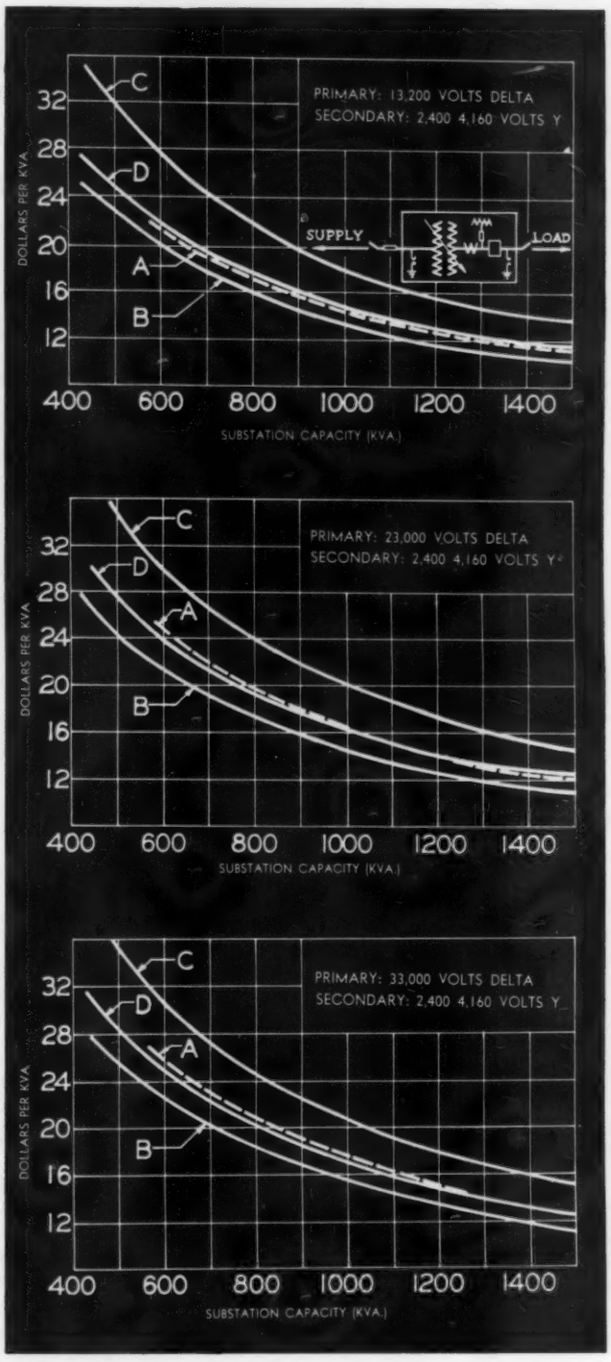


Fig. 1—Cost comparisons. (A) Package sub. (B) Conventional sub with one 3-phase transformer, one 3-phase step voltage regulator and one 7.5-kv., 3-pole, 400-amp. outdoor oil breaker of 50,000-kva. interrupting capacity. (C) Conventional sub with 3 single-phase transformers, 3 single-phase induction regulators, one steel switch house with 7.5-kv., 3-pole, 600-amp. indoor OCB, 50,000-kva. interrupting capacity. (D) Same as C, except for outdoor breaker as under B. (All regulation is ± 10%)

tive to circuits to other substations, should be reached.

In the application of these units to isolated primary systems, it may be necessary to consider at least two, each with sufficient reserve capacity to carry the other's load during periods of maintenance or inspection.

Voltage Regulation

The package substation is built with bus-voltage regulation. There are many instances today, especially in areas at the higher distribution voltages, where adequate service is furnished with no voltage regulation whatsoever at the substation or on the feeder branches. The universal application of the package substation, therefore, might be questioned since it will introduce potential outage hazards through mechanical failure and will undoubtedly increase maintenance and inspection costs, even though it could be proved that inclusion of the step-voltage regulating unit did not materially increase the cost as compared to the conventional substation. It is quite possible that, with voltage regulation available in this manner, certain economies in the arrangement of the feeder conductors could be realized or that the establishment of a more uniform voltage level will not only improve the quality of the service to the customer but also may actually reflect itself in his monthly bill. These are problems that can be solved only by making detailed studies of each specific case and balancing these against operating records.

In the more congested urban areas individual feeder regulation is now used extensively and appears to be preferred to bus regulation. Single-phase feeders emanating from substations appear only in certain limited urban areas. The need for a single-phase package substation is amply covered by the questionnaire.

NORTHWEST ASSN. REPORT

This article on the application of package substations in rural areas is one of the papers presented by the apparatus and design sub-committee of the Electrical Equipment Committee (J. Hellenthal, chairman) at the 1939 meeting of the Engineering & Operation Section, Northwest Electric Light & Power Assn. A. Shipek is with Puget Sound Power & Light Co.

Comparison of Costs

Any attempted cost comparisons of substations must include diversions into the distribution system before the results obtained can be of value. This need not hinder us, however, from making a few simple comparisons by including only those parts of a conventional outdoor substation as would perform the same functions as a package substation.

On this basis the conventional substation will not include isolating and bypass switches, except those external to the substation, though normally these are only a small percentage of the total cost. Otherwise the cost curves submitted herewith include fencing, concrete slabs, ground connection, lightning arresters and yard lighting, all with cost of installation, on a comparatively level lot, readily accessible from the street or highway. Land values are not included though actually they may be slightly in favor of the package station. Comparisons in Fig. 1 are based on a single circuit, fully automatic reclosing and provided with the usual recording and integrating instruments.

A questionnaire on current practices with regard to package units brought replies from nine utilities and one manufacturer. Usually primary protection was reported to be fuses, especially at higher voltages, with circuit breakers used at lower voltages and for higher capacities.

Most all companies reported service is not interrupted for inspection or maintenance. General Electric said it is usual to take the entire substation out. Asked if adjoining circuits should phase, all said yes except Washington Water Power and Pacific Power & Light, who added it was not essential but highly desirable.

Individual feeder regulation was generally reported. West Coast Power was an exception, and Idaho confines this to urban service. G-E said bus regulation is satisfactory for 2,000 kva. or less. In most cases entire subs are not protected by only one breaker, with exceptions under 1,500 kva.

Replies to other questions appear in Table I.

Table I—Questionnaire on Package Substations

Company	Number of stations	Capacities in kva.	Method of bypassing breaker, a*b*c*	Need for single-phase package unit	Max feeder cap. protected by one breaker
Portland Gen. Elec.	20	300 to 3,000	Usually a and c, occasionally b	Might be desirable in rural areas	Usually 200 amp. at 4,150 volts
BC Electric Ry.	—	750 to 3,000	All three	Practically none	300 amp.
NWestern Electric	20	under 500 to 3,000	a and b at larger subs, c at smaller single-circ. subs	Questionable. Single-phase used only in low density	Important feeders have separate breakers
Wash. Water Power	—	usually 1,000 to 3,000	Usually a and b, seldom c	50% in Spokane is single-phase. Extensive rural branches	Usually 1,000 kva., but may be larger in higher densities
Pacific P & L	27	under 300 to 2,500	Principally a, loop feeders c	Only in small capacities	Any feeder which warrants individual connection to bus
Utah P & L	—	Seldom exceed 1,200 for 3 feeders	All three	Could be used in some 50-100 kva.	
Idaho P & L	60	30 to 3,750	All three	All feeders leave sub 3-phase	1,000 kva
West Co. P	14	300 to 2,000	a	Would not be used	Any hazardous circuit or over 200 kva.
Puget Sound	118	300 to 3,000	Commonly a, seldom b, c in small platforms	Almost 100% single-phase 2300 volt resid'l in Seattle. Rural trend to Y	1,500 kva. for suburban high voltage. 300-400 amp. for 2,300-volt urban
General Electric	85	Majority 1,500 or 2,000	a used very infrequently. Feeders bypassed external to sub	No request for quotations on single-phase subs	Separate feeders improve continuity of service or segregate industrials

* (a) By bypassing each individual oil circuit breaker.
(b) By bypass, transferring load to adjoining feeder if available in same substation.
(c) By bypass, transferring load to adjoining substations if feeder mains adjoin.

Small-Plant Conversion

For semi-automatic and remote-control operation

By A. Frank Ayres

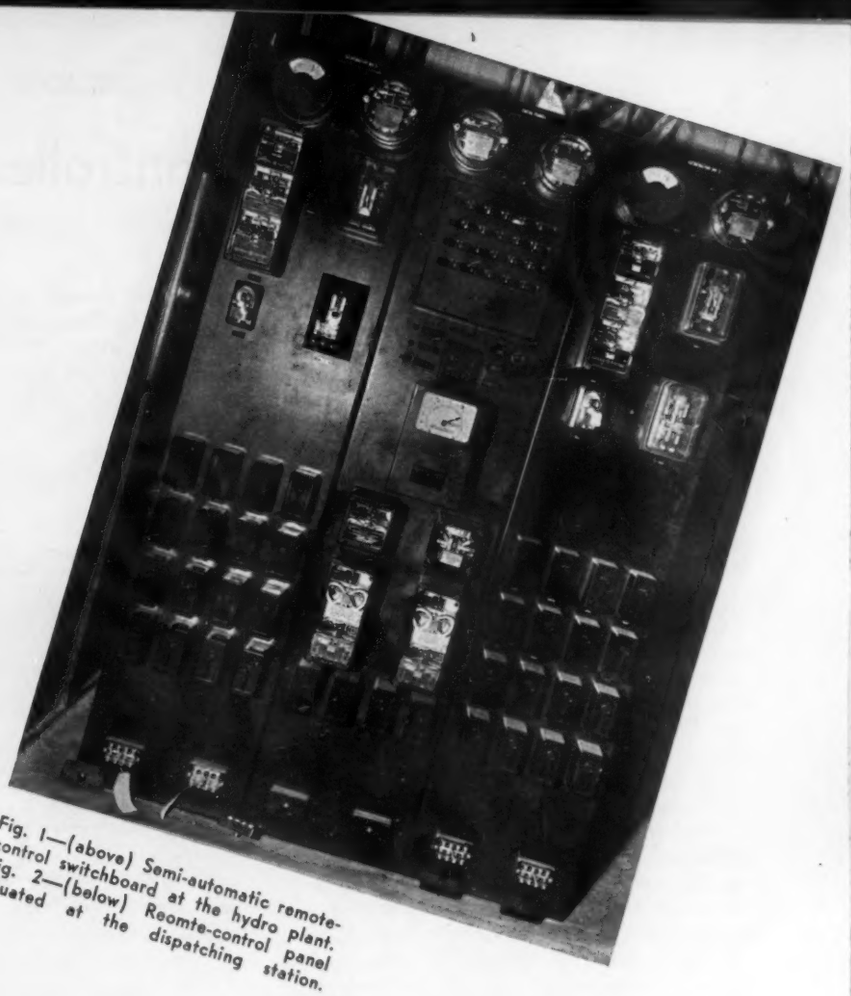


Fig. 1—(above) Semi-automatic remote-control switchboard at the hydro plant.
Fig. 2—(below) Reomte-control panel situated at the dispatching station.

IN keeping with the trend toward more automatically operated equipment, Nevada-California Electric Corp. recently changed its Bishop Creek Plant No. 5 from manual to semi-automatic operation. In addition to semi-automatic, certain remote-control equipment was included.

This, the fourth in a series of five hydro-electric plants on Bishop Creek in Inyo County, Calif., has two generators with a combined rating of 3,625 kva. The small equalizing forebay has such limited capacity that the plant may be considered to be strictly stream-flow. Generation is at 2,300 volts, with direct transformation to 100 kv. to tie into the main transmission system.

To accommodate a probable 40-hr.-per-week operating schedule would have involved the construction of additional housing. By changing the plant to the present semi-automatic, remote-control basis, housing expenditure was avoided, and annual operating costs greatly reduced. Total cost of the program was such that savings in housing and operating costs should equal the expenditure in less than six years.

Plant Modernization

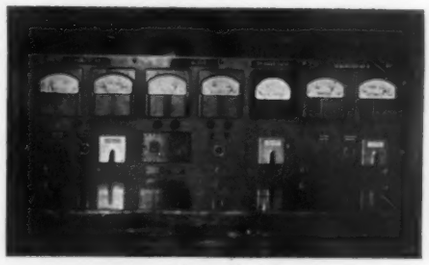
Modernization included replacing oil circuit breakers with new ones of capacity sufficient to clear maximum anticipated faults. Electrically-operated field breakers were installed, and modern voltage regulators added for each machine. A motor-driven head was added to the one governor not so equipped, and necessary electrical control features were added to both governors. The one individually-operated exciter in the plant was moved and connected to its generator by V belts—the other generator having a direct-connected exciter. A 125-volt storage battery of moderate capacity was installed complete with automatically-controlled charging equipment.

Semi-automatic Equipment

An operator will place machines on the line, but once in operation, generators are expected to require no more than occasional inspection. This means that the operator must be subject to call at his cottage or on the premises but does not require his remaining in the plant.

The semi-automatic protective devices have three general classifications. The first group provides protection against the more serious types of faults. Devices included in this group cause an immediate, complete shutdown by tripping the oil circuit breaker, field breaker and governor of either or both generators, as may be required, and protect against: generator winding differential, hot bearings, loss of field, thermal overcurrent, loss of governor-head potential, breakage of oil-pump belt, overspeed, system undervoltage and master-breaker directional overcurrent.

Devices in the second group operate through a time-delay relay, and an alarm at the start of the sequence calls the operator to the plant. If the operator clears the difficulty during the interval before the timing relay has completed its cycle, no further action takes place. But if the operator fails to respond promptly, the timing relay completes its action and causes a complete shutdown in a manner similar to the first group. The second group protects against: low governor-oil-pressure, system overvoltage, system overfrequency and low intake level.



Although alarm and annunciator action are provided for all devices in the first two groups, a third group exists for which nothing but alarm and annunciator action take place. Such protection is against: generator overcurrent, low water-level in the forebay of the next lower plant, transformer temperature, d.c.-control-bus failure, low pressure in auxiliary bearing-oil system and tripping of local power circuits.

All protective and auxiliary relays, the plant annunciator and remote water level indicator are mounted on three 20x90-in. steel panels (Fig. 1).

Remote-Control Equipment

As this plant is only about 1,000 ft. from the main dispatching station of the transmission system, it was con-

sidered desirable to provide certain remote-control features at this point. A 50-conductor armored cable of No. 16 wire was laid underground between the power house and dispatching station. This provides for: indication of amperes, kilowatts and volts for the generators and local circuit, load- and voltage-control circuits for both machines and indication and control for a water by-pass valve. In addition, emergency shut-down push buttons are provided for both generators and the plant master breaker. All this remote-control and indicating equipment is mounted on a 10x34-in. panel on the dispatcher's desk (Fig. 2).

Automatic Load Control

Generator output is automatically controlled in accordance with available water. A float in the forebay actuates a remote-water-level transmitter, sending the proper intake level over a leased telephone circuit to the main transmission dispatching station 1½ mi. away. There, a recorder maintains a continuous record of intake level. High- and low-water contacts are a part of the recorder and serve to actuate necessary alarm or protective features at the plant. The water-level circuit is continued from the dispatching station to the plant through the 50-conductor remote-control cable.

At the plant, a receiver designated by the manufacturer as a 'Balantrol' indicates the intake level and regulates the amount of gate or needle opening for either machine. As the intake level tends to rise, the 'Balantrol' unit causes the machine to increase its output and a falling water level decreases the generator loading. This device tends to retain a fairly constant forebay level regardless of the amount of water supplied to it by the plant above. A transfer switch on the 'Balantrol' unit makes possible the selection of either generator for automatic load control—the other machine being operated on a block-load basis. Under normal operating conditions, remote-load supervision at the dispatching station is not used, thus leaving regulation to the automatic 'Balantrol' unit.

Operating Results

During the first three months of its operation on the semi-automatic basis, this equipment has performed in a satisfactory manner. A few more months may be required before all small difficulties such as usually accompany an installation of this nature are eliminated, but results so far are encouraging. This installation is being watched with special interest in order to determine to what extent similar programs may be applied to other hydro plants on the Nev-Cal system.

Controller Facilitates Testing

By T. M. Blakeslee

Modern, synchronous-machine voltage regulators operate from all three phases of the terminal voltage through the medium of a torque motor, rectifier, or positive sequence network. Many under- and over-voltage relays operate similarly. The proper testing of these devices requires a 3-phase supply, the three phases of which may be varied separately or in unison.

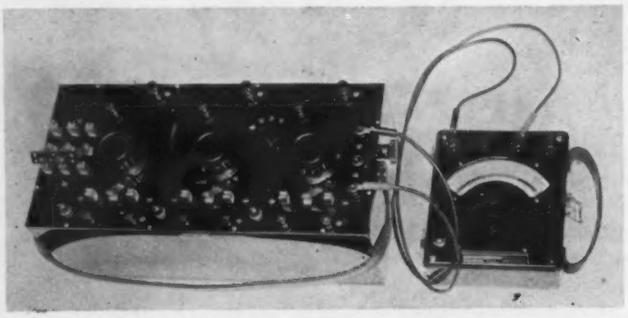


Fig. 1—Variable auto-transformers comprise 35½-lb. assembly

A simple way of doing this is by means of the device shown in Fig. 1. It consists of three of the popular continuously-variable-ratio, toroidally-shaped, auto-transformers, mounted in a single carrying case. The assembly weighs 35½ lb. Dials of the three units are connected to a single shaft through gears and friction clutches, thereby allowing individual or group control. Voltmeter terminals and a three-position switch provide means of quickly connecting one instrument to the several output phases.

The device may be used on a 240-volt power source or from the 115-volt output of potential transformers. A 3-pole, double-throw switch permits star or delta connection of the auto-transformers, and, with this switch open, the units may be used singly or in parallel on single phase. Fuses of 2-amp. rating protect the auto-transformers.

Aside from the uses of the apparatus in power system testing it is valuable as a general laboratory device. For purposes of instruction, it may be used effiectively in conjunction with an oscilloscope to demonstrate the fundamentals of third-harmonic frequencies in 3-phase transformers.

Phase Relations in the Northwest

By Elmer F. Anderson

On the opposite page are diagrammed voltage and phase relations for major Northwest power systems at their points of tie. No attempt is made to indicate future ties or present tie capacities.

What the plate amounts to is a geometric diagram showing line voltages in kv., points of tie (city or town), voltage vector relations at the ties and at transformations within a system, phase rotation of the voltage vectors and system phase markings. The last correspond with those used by the systems themselves.

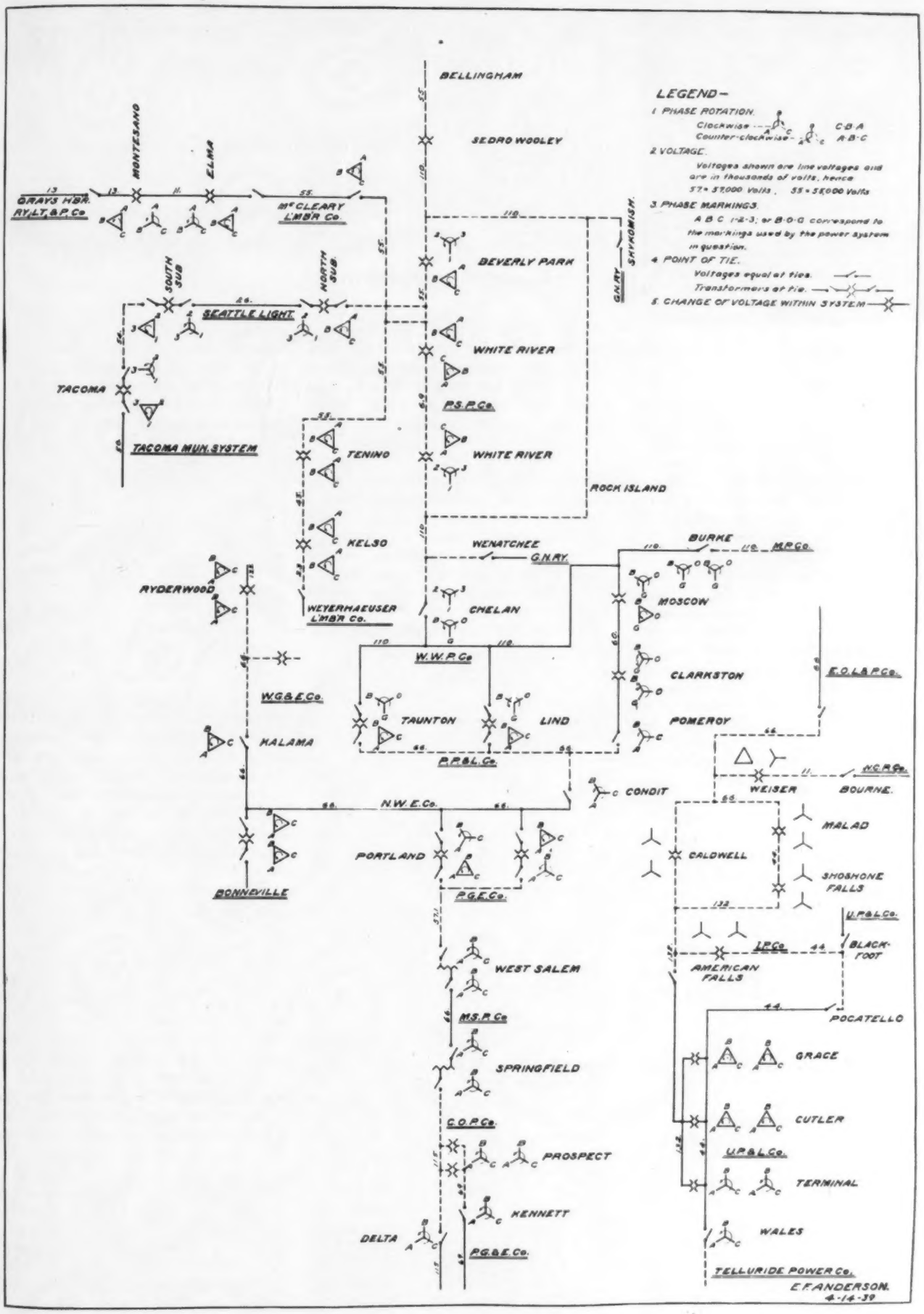
If two systems are tied at the same high-tension voltage, only a switch and voltage vector diagram (Y or delta) are shown. For example: California-Oregon to Pacific Gas and Electric at Kennett and Delta, Calif.

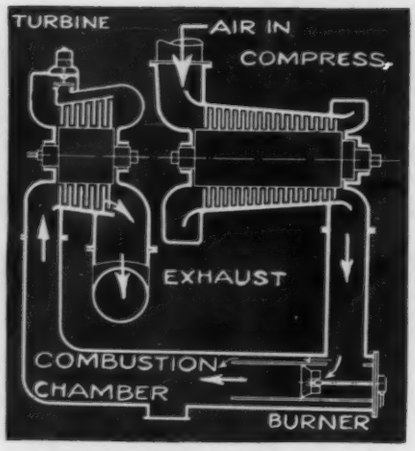
If transformers are used at the point of tie, transformers, voltage vectors and switches are shwon. Example: Copco to Mountain States at Springfield.

Where voltage changes within a system, only the transformer and its voltage vectors are shown. Example California-Oregon at Prospect, Ore.

As a point of reference, Y vectors of Portland General Electric, Mountain States Power and California-Oregon Power were taken as a standard. All other vectors are related to these.

This diagram was prepared for, and presented to, the Engineering and Operation Section, Northwest Electric Light & Power Assn., at its 1939 meeting. The writer expresses appreciation to engineers of the various utilities for data which made this paper possible.


BELLINGHAM
SEDRO WOOLEY
MONTESANO
ELMA
GRAYS HBR. RY. LT. & P. Co.
McCLEARY LMBR Co.
BEVERLY PARK
SOUTH SUB
NORTH SUB
SEATTLE LIGHT
WHITE RIVER
TACOMA
P.S.P.Co.
TACOMA MUN. SYSTEM
TENINO
WHITE RIVER
ROCK ISLAND
G.N.RY.
SKYKOMISH
KELSO
WENATCHEE
G.N.RY.
BURKE
M.P.Co.
RYDERWOOD
WEYERHAEUSER LMBR Co.
CHELAN
MOSCOW
W.W.P.Co.
CLARKSTON
E.O.L.&P.Co.
W.G.&E.Co.
TAUNTON
LIND
POMEROY
HALAMA
P.P.&L.Co.
N.C.P.Co.
WEISER
BOURNE
CONDIT
N.W.E.Co.
MALAD
PORTLAND
CALDWELL
SHOSHONE FALLS
BONNEVILLE
P.G.E.Co.
U.P.&L.Co.
I.P.Co.
BLACKFOOT
WEST SALEM
AMERICAN FALLS
POCATELLO
M.S.P.Co.
GRACE
SPRINGFIELD
C.O.P.Co.
CUTLER
PROSPECT
U.P.&L.Co.
TERMINAL
KENNETT
WALES
DELTA
P.G.&E.Co.
TELLURIDE POWER Co.
LEGEND—
1. PHASE ROTATION.
Clockwise ---- C-B-A
Counter-clockwise ---- A-B-C
2. VOLTAGE.
Voltages shown are line voltages and are in thousands of volts; hence
57 = 57,000 Volts, 55 = 55,000 Volts
3. PHASE MARKINGS.
A-B-C (1-2-3; or B-O-G) correspond to the markings used by the power system in question.
4. POINT OF TIE.
Voltages equal at ties.
Transformers at tie.
5. CHANGE OF VOLTAGE WITHIN SYSTEM
E.F.ANDERSON.
4-14-39



Gas Turbines Come of Age

Thirteen units in service or on test. Improved compressors make 18% cycle efficiencies possible. Higher efficiencies will come. Ability to operate without water on low-grade fuel suggests Western applications

ALL the way to San Francisco from Baden, Switzerland, Dr. Adolph Meyer, director of Brown, Boveri & Co., Ltd., journeyed last month to deliver a 30-minute paper. His subject: "The Combustion Gas Turbine".

For years, the idea of a prime mover which would involve neither boilers nor reciprocating parts has been an engineer's dream. Now, it appears, this dream is becoming an actuality.

If the combustion gas turbine takes its place among available prime movers, as Dr. Meyer's report indicates, it may some day find important applications in the Western States. The gas turbine requires no water and can burn the cheapest kind of oil. These characteristics would become significant advantages in many parts of the West, where water is scarce but cheap fuel plentiful.

What is the status of the combustion turbine? How far may it be expected to progress? The following answers to these questions were contained in Dr. Meyer's paper, presented at the semi-annual meeting, American Society of Mechanical Engineers, San Francisco, July 10-15, and in "Now Gas Turbines That Work", *Power*, June 1939.

What the change to a combustion turbine amounts to is resolving the compression and power strokes of a reciprocating internal-combustion engine into a continuous operation. Thence come these advantages:

(1) Direct conversion of energy to power on a rotating shaft, eliminating reciprocating parts and simplifying fuel injection and cylinder lubrication; (2) elimination of need for cooling water; (3) elimination of auxiliaries, except starting motor; (4) saving in space, foundations, housing; (5) ability to burn low-cost fuel; (6) ability to start in a few seconds.

How It Works

The simplest form of practical unit built to date takes air through an axial blower, compresses it to 30-50 lb. per sq. in., mixes it with oil fuel, and burns the mixture in a combustion chamber together with excess air. The gases enter the turbine, which is on the same shaft as the blower, at about 1,000 deg. F. (Fig. 1). About 75% of the turbine output is used to drive the compressor, and operation is equivalent to a reciprocating compression ratio of 2- to 4-1. A motor brings the turbine to quarter speed for starting.

Present economical size is in the range of 2,000 to 8,000 kw. net output, and a 2,000-kw. unit weighs about 40 tons without generator. Over-all thermal efficiency of such a unit is 15-18%.

Raising the Efficiency

At first, gas turbines were impractical because the energy required to drive the compressor was greater than the turbine output. There are two principal reasons why net output has passed the zero mark: (1) Compressor efficiency has been raised by development of the 10- to 12-stage axial unit. (2) Higher temperatures have been allowed by use of materials developed largely in connection with higher-temperature steam turbines.

The single-shaft unit described above, working at 1,000 deg., yields efficiencies of 15-18%. This figure can be improved by three means: (1) using air preheat and two shafts; (2) raising the working temperature; (3) improving turbine-compressor efficiency.

The first means is available today and has been applied to certain units. One turbine operates on a shaft with the compressor, driving it at optimum speed for the particular load. A second turbine drives the generator at constant speed. This, plus preheating, yields an efficiency of 23%.

That improvements by the second means will be forthcoming seems probable, because some diesel superchargers work at nearly 1,200 deg. Thus 1,200 deg. looks like a temperature that can be expected soon, while 1,800 deg. seems possible but more remote.

As to the third means, thermal efficiency is a function of the combined efficiencies of compressor and turbine. These efficiencies have reached the point where their product exceeds 70%. Beyond this, each 1% increase in efficiency of either compressor or turbine will improve cycle efficiency by 4%.

Take, for example, a 2,000-kw., two-cylinder gas turbine. If turbine efficiency is 86%, compressor 83% (product 71%), and if temperature before turbine is 1,200 deg., cycle efficiency without air preheating would be 24%. This would rise to 26.5% with a preheater of 5,000 sq. ft., and to 33% with a preheater of 30,000 sq. ft.

Status Quo

With large steam turbines operating at better than 25%, the gas turbine is at present making no bid for a place in the base-load plant. Its enumerated advantages do, however, point toward possible use for peak and stand-by. A 4,000-kw. unit is now on the Brown-Boveri test floor, to be delivered to Neuchatel, Switzerland, for installation as a bomb-proof, stand-by plant.

But excepting this, installations to date have been for oil companies, where gas to drive the turbine is available as the result of a refining process, and where compressed air is needed for supercharging the process. The relation of gas exhausted to air required by the process is such that the turbines develop a small amount of excess power, which is used to drive a generator.

Allis-Chalmers Mfg. Co., which designs and builds continuous-combustion turbines under license from Brown Boveri, has three such units on the test floor, two in course of erection.

Thus 12 of the existing 13 units are not straight power sources but are incidental to a process. It is significant, however, that the first of these was installed in December 1936, that they are being installed at an accelerating pace, and that the first central-station application has already come about.

MEYER

JOYCE

RICE

Trade Dinner

Western radio and appliance men convene at bi-annual function

TRADE dinners, like the markets at which they are held, point the future. By this sign the future of appliance merchandising should see a stiffening of prices, and television begin to emerge from its cocoon and spread irridescent wings very soon.

To appliance dealers and salesmen the apex of the twice-yearly market weeks at Western Merchandise Mart, San Francisco, are the radio and appliance trade dinners. The Market this year was held a bit too early, perhaps, and though attendance was good, buying for fall proved slow. The Mart's functions—to provide permanent displays by which to place new styles and models before the trade, to stimulate manufacturers toward production of more salable products, and to save the buyers' time in selection of merchandise for floor stocks—were fully performed.

The trade dinner's function—to point trends in selling or enthuse sales groups for renewed effort—during this June 2 6to July 1 market pointed to television as the new horizon of sales, and gave enthusiasm to the age-old struggle for price courage.

Thomas F. Joyce, vice president and advertising director, R.C.A. Manufacturing Co., of Camden, N. J., spoke on "Television and the Future of the Radio Dealer." Al F. Rice, manager of market development, Southern California Gas Co., Los Angeles, pulled no punches when he talked of mail order house competition and prices in his address, "New Appliances Present New Opportunities." Al H. Meyer, president of Pacific Appliance Institute and of Leo J. Meyberg Co., was chairman of the dinner.

"Quit asking manufacturers to supply you with stripped models at prices to meet mail-order house competition," said Rice, himself once a distributor of refrigerators. "I have learned that mail order houses do have a policy. It is to sell no nationally advertised goods, to sell their own private brands, and always to be under the prevailing price, no matter how low that is. You can't outplay them. If you ask the manufacturers for competing merchandise, they will still be lower. If, on the other hand, you ask the manufacturers to come up the scale, they will come up in proportion."
will come up in proportion."

Not new models and new appliances, but that retailing must be better paid, and that management must protect the pay of salesmen by refusing to chisel and give away margins that are now adequate if not given away, he said was most needed.

As an outside observer, Rice said, he felt that the unwillingness of large metropolitan stores to undertake the stabilizing job necessary was cause of the chaos in retail selling among small dealers. The latter, he charged, reacts on the larger retailers. Market stabilizing programs under the Fair Trade laws should be undertaken by the large dealers instead of trying to drive out the small dealers. Small dealers cannot be driven out. They will cooperate if they do not fear extermination from the price wars of large retailers, he assured them. A well paid, well recompensed retail trade will put vitality, vigor, enthusiasm into selling again. For prosperity consumption must equal production—and that means retailing.

Thomas Joyce certainly took television from under wraps in his address. All the "ifs" were stripped away as if they were veils on a Salome dancer, one at a time. Since television receivers were placed on sale in New York, very few have been sold. Surveys sought the answer. Criticisms were never as to the quality of reception but that there was not enough television on the air, too much movie film used, prices were still too high, and some said it was the wrong time to sell high-priced merchandise designed to keep folks indoors. Service charges, too, the public felt, were high.

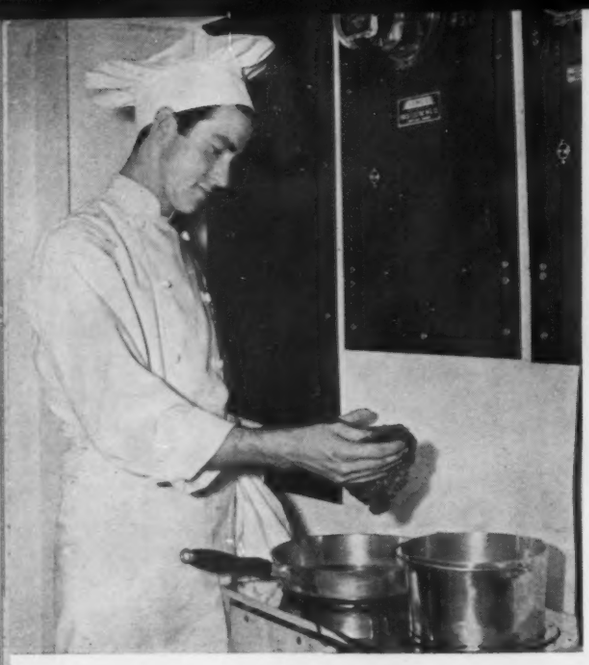
Leave the technical problems to the engineers and researchers, he said. Already many of the first obstacles are showing signs of being removed. Telephone wire transmission tests show promise that something can be done. Portable field equipment for pick-up is being simplified. The othoconoscope is producing better quality pictures with present equipment. Limited range seems to be losing its limits as broadcasts from New York are being picked up far beyond that city's horizon. Even some European broadcasts are being picked up. What if they look like jigsaw puzzles? Early short wave was as scrambled as eggs.

"No power on earth is going to stop for long a service to the world," concluded this daring young man on a verbal trapeze.

Stole the Show

Extra space at Fair for Westinghouse's popular robot

More space at the Golden Gate International Exposition has been taken by Westinghouse, according to G. H. Lewis, exhibit manager for the company at Treasure Island. Space across the aisle to the west of the present Westinghouse exhibit, one of the largest in the Palace of Electricity and Communication, is now being used to permit larger audiences to see Willie Vocalite, the mechanical man. Another educational exhibit, with the Sterilamp and its effect on bacteria, is arranged near it. In the space formerly occupied by the robot, electrostatic dust precipitation for air conditioning will be demonstrated. Crowds seeing the mechanical man have been so large that other exhibits have sometimes been eclipsed, Lewis said.



Take 'em Young, Teach 'em Electric

NO wonder Portland's restaurants are leaders in the West in modern electrical equipment. Out of 14 of downtown Portland's eating houses 10 are all-electric and the remainder use electric equipment extensively. More remarkable, however, is the way that Portland restaurant owners assure themselves of well trained personnel capable of getting the full value out of electric cooking. They do it by participating in a vocational training program conducted by Portland School District No. 1.

Begun about 5 years ago in the former cafeteria in the Public Service Building, the restaurant training program has received the sponsorship of Associated Restaurants of Portland, which trade association acts in an advisory way to Frederick G. Leasure, director of vocational education. Portland's two electric and a gas utility, manufacturers and distributors of restaurant equipment and even the culinary unions are cooperating in the enterprise.

Recently the restaurant school moved to the south mezzanine floor of the Portland Public Market. When it did the advisory committee worked with architects and supply people to design a compact and complete training kitchen as well as to advise with school authorities on the training program. That the majority of the cooking and refrigerating equipment is electric is testimony of the esteem such equipment enjoys with Portland restaurants. To keep abreast of new developments the committee, cooperating with manufacturers and distributors, expects to replace present equipment as rapidly as new and improved food preparing machines are developed.

Installed by Montgomery Electric Co., the electric equipment begins with a 200-amp. main service, at 208 volts, 3-phase. Most novel is the Griswold 2,600-watt inductance hotplate which heats 85% faster than highest speed units. Operating at 98 power factor without a condenser it makes a desirable load. To the restaurant it means super-speed in cooking of frozen foods.

Other equipment includes waffle irons, automatic toasters, a steriscald unit, a sandwich toaster, fry kettle, stock pot, an electric warming table and two heavy duty electric ranges.

On a separate panel of 94 amp. are an electric potato peeler, a large refrigerator, a dishwasher and a Peterson ventilation system immediately over the range surfaces. The lighting panel of 60 amp. supplies a new lighting technique—continuous rows of lumiline lamps over the range hood and the serving counter—besides general lighting and a 660-watt bun warming compartment.

Instruction is in charge of Mary L. Loomis, school manager, a trained University of Washington and Battle Creek dietician with practical restaurant experience as dining room manager also. With her is Alice E. Stone, experienced restaurant cook, as cooking department instructor. A maximum of 38 students are taken at a time, comprising a cooking and waitress staff of apprentices. A trade preparatory training course to furnish young cooks the minimum requirements of the trade as determined by the restaurant committee, requires six months. During this time the student is taught various branches of cooking by actual participation in this test restaurant, open to the public at the Portland Market. Type jobs include the dinner cook, fry cook, pantryman, baker, storekeeper, dishwasher. Training does not make finished chefs but does prepare young men and women for employment.

Portland restaurants now require this course as a prerequisite to employment of new help.

Another function of the model restaurant is that of a demonstration kitchen to which the manufacturers and distributors of restaurant equipment cooperating may bring their prospects for an actual test of the equipment in operation. Plans are under way to hold the meetings of the Associated Restaurants of Portland at the school. Electrical industry meetings are held there too. In either case the demonstration value of the operating kitchen is an asset to the electrical industry.

Trade extension classes for employed cooks have been requested by the culinary unions for their members.

"Perhaps nowhere else in the country," says Mr. Leasure, "is there a vocational training program which has so many possibilities of serving an industry."

To the electrical industry it also means a crop of cooks trained in the efficient use of electric equipment and liking it enough to ask for it.

At top of page, a young cook at the inductance hotplate, speediest cooking in any medium. Above him are the meter and switch panels. At left three views of the compact serving counter and kitchen, lumiline lighted. At bottom the warming table

Appraisal Plans Progress

Central Appraisal Bureau and Cal-Oregon Power light the way

Development of the Central Appraisal Bureau in Portland has continued in leaps and bounds since its inaugural schedule, January, 1936. Established then in separate committees to study the values of used or obsolete gas, electric, wood and coal ranges, the Bureau first proceeded cautiously, revising its first schedule in May, 1936. Since then several revisions have been made and the schedule now in use dates from April, 1939, which incorporated trade-in allowance valuations on mechanical refrigeration.

When the Bureau first began, it had 15 prominent dealers as members. Today 45 men have combined their interests, and the Bureau strides forward to even greater membership.

Where dealers before were in the business of buying second handed ranges, now they are selling new merchandise. Excessive trade-in allowances are "out". The fear of the loss of a sale has gone, too. Today, every bit of second hand merchandise, carried over as a 1938 inventory and accrued through intelligent appraising, is saleable at a good margin of profit.

Systematic shopping tours are conducted on dealers, and with the exception of a few "honest errors" by members and their salesmen, the Bureau's appraisal plan has been found to be practical. Penalties are not inflicted. When violations are made, the head of a company is seen, along with the salesman involved. This merely results in the salesman being warned. The dealer is informed again that he is in business for the purpose of profit. Persistent violations by the salesman, however, sometimes mean his removal from an organization.

Manufacturers and distributors of appliances are rapidly cultivating a direct interest in the operation of the Bureau, and for this reason have been more cautious where they place their new merchandise.

The Central Appraisal Bureau does not make any direct appraisals, nor does it enter into the transaction beyond prescribing trade-in valuation.

Copies of the present schedule include dealers names and telephone numbers for the convenience of dealers, who may check up customers' stories regarding trade-in offers. "Shopping tours" of customers are therefore tactfully and successfully terminated.

The California-Oregon Power Co. likewise has adopted such an appraisal plan. Programs have been begun in various communities in the company's territory to establish trade-in prices along the line of the system now used in the automobile industry.

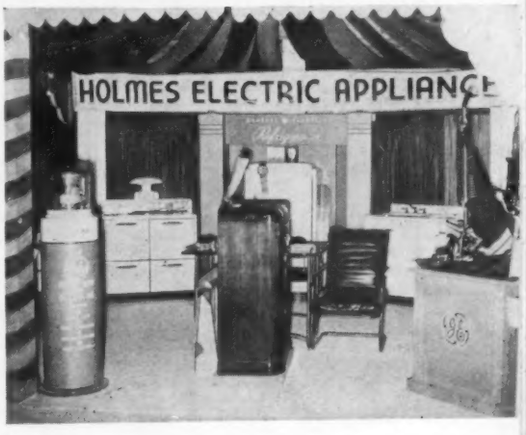
A used range "blue book" has been set up, giving maximum trade-in allowances for various models of electric ranges to be used by the utility company and dealers as a guide in pricing allowances. The company buys all electric ranges from the dealers at the "blue book" price less 20%. These ranges are then rebuilt by the company and resold as used merchandise.

From the dealer's standpoint, an immediate market for used equipment is assured, and every transaction can be clean cut without tying up profit in used equipment. From the company's standpoint, such a program encourages the dealer to help maintain modern and satisfactory load sources, and provides the company with equipment, which can be rebuilt and sold to lower income brackets. And operating results and maintenance costs are so controlled as to satisfy both customer and company.

Idaho Home Show

Boise Home Modernization and Electrical Show draws 4,000

Sponsored by the Electrical Equipment Sales Assn., a Home Modernization and Electrical Show was held in Boise June 8-11. In all there were 29 exhibits, consisting of such modernization equipment as electrical appliances, adequate wiring, new paint, lumber and hardware displays. The attendance record of the show during the four days and nights approximated 4,000 people.



SCENES at the recent Home Modernization and Electrical Show, sponsored by the Electrical Equipment Sales Assn., include (top down) the exhibit of the General Paint Co., featuring General Paint and the Gibson electrical range and refrigerator. Next a model kitchen, a display by the Boise Payette Lumber Co., who installed the wooden cabinets and shelves. This kitchen is a unique departure from the usual stainless steel models and shows how effectively wood may be used. Aboard the bicycle, pumping away and getting nowhere, is R. E. Nichols of Westinghouse, who is trying to generate enough electrical energy to light the lamp at right. A chart on the wall showed stationary bicyclers at the exhibit how much they earned for their efforts. Holmes Electric Appliance exhibit below put on a G-E appliance show that packed them in, and drew high praise

Future Campaigns

Fall appliance sales programs prepared by western utilities

What the customer is in line to buy this autumn is outlined by appliance sales managers of western public utilities. See among these future campaigns what the consensus of opinion is:

British Columbia Electric Railway Co., Ltd.—Fall activity is to be centered on electric ranges with a special company display at the annual Vancouver exhibition, Aug. 28 to Sept. 4.

Idaho Power Co.—Electric range and water heater campaigns for August. In September, Mazda lamps, IES lamps, electric ranges, water heaters. Modern kitchen is special display, with other shows at district fairs in September.

Los Angeles Bureau of Power & Light—Water heater campaign is scheduled for August.

Nevada-California Electric Corp.—Water heater campaign listed for September.

Pacific Power & Light Co.—During August, an electric range campaign, with water heater campaign in September.

Puget Sound Power & Light Co.—Water heater, range and refrigerator campaigns for August and September. In September a display at western Washington Fair is planned.

San Joaquin Light & Power Corp.—Electric range campaign for August, with reflector lamp campaign planned for September. Special electric kitchen display will be shown at county fairs.

San Diego County Bureau of Electric Appliances—Refrigeration campaign set for August. A radio and laundry equipment campaign scheduled for September.

Colorado Central Power Co., Golden, Colo.—July, ranges, refrigerators and water heaters.

Home Gas & Electric Co., Greeley, Colo.—July 15-Aug. 15, stoker showing.

Mesilla Valley Elec. Co., Las Cruces, New Mexico—July, evaporative coolers; Aug., range and water heaters, with special advertising.

Mountain States Power Co., Casper, Wyo.—July, air conditioning and roasters; Aug., ranges; Sept., light bulbs.

New Mexico Power Co., Santa Fe, New Mexico—July and Aug., refrigeration and roasters.

Southern Colorado Power Co., Pueblo, Colo.—July, ranges, water heaters, refrigeration; Aug., ranges, water heaters and roasters; Sept., ranges, water heaters and I.E.S. lamps.

Southern Colorado Power Co., Rocky Ford, Colo.—July and Aug., ranges and water heaters.

Southwestern Public Service Co., Carlsbad, New Mexico.—July, roasters.

Southwestern Public Service Co., Roswell, New Mexico—July, air conditioning; Aug., air conditioning and Better-Light-Better Sight campaign.

Utah Power & Light Co., Evanston, Wyo.—July, ranges, water heaters, roasters and commercial cooking; Aug., I.E.S. Lamps and cooking school; Sept., lamp bulbs.

Utah Power & Light Co., Green River, Wyo.—July, ranges, water heaters, roasters and hotplates; Aug. and Sept., ranges, refrigerators, water heaters and lamps.

Western Colorado Power Co., Montrose, Colo.—July, roasters and hotplates; Sept., lamp bulbs, I.E.S. lamps.

Western Public Service Co., Laramie, Wyo. and Las Animas, Colo.—August, ranges, refrigerators, water heaters and roasters; Sept., commercial lighting activity.

Public Service Co. of Colo., Denver, Colo.—July, Aug. and Sept., I.E.S. lamps, fluorescent lighting, refrigeration and air conditioning.

Denver Dealer activities—July, Aug. and Sept., adequate wiring, refrigeration, I.E.S. lamp and fluorescent lighting.

APPLIANCE SALES REPORT, 1939

A Summary of Dealer and Utility Reports Compiled by Associations, Societies, Bureaus, or Dealer Contact Departments of Utilities

REPORTING COMPANIES	Idaho Power Co.[1]		Northwestern Elec. Co.[2]		Montana Power Co.[3]		P. G. & E. Co.[4]		San Diego Cons G. & E. Corp.[5]		San Joaquin Power[6]		Southern Calif. Edison Co., Ltd.[7]		Utah Power & Lt. Co.[8]		Wash. Water Power Co.	
	Current	†Mos.	Current	†Mos.	Current	5 Mos.	Current	5 Mos.	Current	†Mos.	Current	6 Mos.	Current	6 Mos.	Current	5 Mos.	Current	†Mos.
Ranges					155	451	350	1,486			95	700	183	1,055	492	1,472	248	1,078
Water Heaters					24	64	249	1,164			56	370	70	391	212	462	172	688
Air Heaters, aux.							89	1,989			7	123	24	735				
Air Heaters, 220							55	421			60	298					12	359
Refrigerators					1,034	2,852	4,878	18,610			1,030	3,581	4 828	18,646	1,518	3,789	938	4,461
Dishwashers							12	58			5	14			8	19		2
Washers					624	2,525	2,558	12,655			400	1,818	2,390	12,709	918	3,742	501	2,647
Ironers					58	206	433	2,190			53	249	322	1,563	66	267	29	167
Vacuum Cleaners					207	1,048	2,351	13,139			54	539	1,119	6,713	399	1,848	172	1,324
Radios					827	5,529	8,430	43,557			649	3 298	4,094	25,078	1,108	7,795	1,251	7,734
Mixers							271	1,341			44	240	226	1,440	146	726	101	680
Cookers, Casseroles											4	23	48	202	5	57	355	1,337
Irons											240	1,412	1,068	6,150	1,316	4,587	687	3,464
Waffle Irons											58	452	311	1,921	312	1,751	140	877
Toasters											86	687	462	2,855	337	1,747	310	2,037
Table Stoves					998	4,248					27	147	201	1,195	377	1050		
Heating Pads											8	221	52	1,011	174	954	42	489
Curling Irons													30	254	159	626		
Coffee Makers											105	744	340	1,587	429	2,100	276	2,038
Sewing Machines							537	2,332			3	53			202	841	75	459
Clocks											124	792	449	2,757	248	1,498	170	1,186
Fans											225	368	503	821	51	99	272	662
Floor Polishers																		
Sun Lamps													22	247	4	41	8	74
Reflector Lamps											262	1,121					399	5,513
Misc. Lamps					679	3,341											732	4,489
Shavers													182	1,240				
Yard Lights											32	266			23	160		

SOURCES

[1] Figures compiled by Electric Equipment Sales Association. Include power company sales of all reporting dealers.

[2] Lists appliances sold by dealers in Portland area. Figures compiled by Northwestern Electric Company.

[3] Combined dealer and company sales from report of Montana Power Co.

[4] P. G. & E. reports sales of major appliances only based on accurate reports from dealers' accounts. Ranges, water heaters and air heaters include company and dealer sales. * Due to delays in compiling report current and total figures are always one month behind those figures of companies reported in other columns of this table.

[5] Gathered by Bureau of Radio and Electric Appliances of San Diego County. Estimated monthly sales figures used in this table: Miscellaneous figures includes fans, curling irons and sun lamps.

[6] Compiled from dealer reports by Merchandising Division of San Joaquin Power.

[7] Includes reports from dealers on San Joaquin Valley system of company as well as Southern California areas served.

[8] Includes Utah Power & Light Company territory in Utah, Idaho and Wyoming. Also Western Colorado Power Company territory.

† June figures were not available at time of going to press.

Copyright 1939 by Electrical West, 68 Post Street, San Francisco. All rights reserved including permission to reprint in whole or in part.

No. 8-c AUGUST, 1939

Electrical West

Sales Guide

Your Stake in Washers

There is still money to be made in the sale of the washing machine. No other electric appliance enjoys such universal acceptance. Its high saturation means that there is a large replacement market every year. Models are available for you to sell in any buying level. Mechanism has been perfected and has reduced service costs. While it is true there are price slashes that take the profit out of selling the "leaders" it still pays a dealer or salesman to sell up to better models where the margin brings sufficient compensation for the effort.

Three markets await. (1) Brides and those who have never used a washer. They need the good old fashioned demonstration and full sales presentation. Young brides were just kids when their mothers bought a washer and do not know the story. (2) Those whose washers have worn out or who want a more efficient modern machine. (3) Those in hard or reduced circumstances who want to do their own washing to save money.

Watch wedding announcements for the first. Birth notices too, for a home with a new baby needs lots of washing done. Service calls will help locate the second kind of prospect. Canvassing will still find the last type —or all types.

National Washer-Ironer Week this year is Oct. 14-21. Watch for tie-in material.

and in Ironers

Unlike washers, ironers have not been discovered yet by a majority of women. When they are they will sell better than washers for there is more need for them in the home than almost any other appliance.

But because almost nobody is doing much to sell ironers, doesn't this make a wide open opportunity for you? Most ironers today are **bought,** not sold.

A few salesmen and dealers who have tried it have found that calls on users whose washer is almost paid for or just paid for turn up a fine percentage of prospects. Some even start making calls on washer customers after about three months from the sale. Many customers then realize the need of an ironer to take on the heaviest burden of washing—the ironing—and are willing to refinance and combine the ironer and washer payments.

In selling an ironer it has been found smart to keep away from "shirts". That is, sell the advantages of ironing even the easy pieces the easiest way, of doing the bulk of the ironing at first and then as expertness comes with practice to take on perhaps the shirts and other more tricky articles. In other words, sell the overall total usefulness of an ironer to save so much time, energy and to eliminate standing.

What Home Laundry means to You

What to Say

—to Sell the Quality L

from which your real compensatio and

Price?

No matter how low the price—there is always a washer or ironer on sale cheaper somewhere else. So it's a question either of giving up, or selling up. And selling up earns more bread and butter. It buys the baby shoes, and you the things you want to have, including vacations and good times.

How to sell up is the question. Price does look mighty important just now.

Most salesmen think selling gadgets or "quality" will do it. But the thing that really raises a sale is a word picture of benefit to the user. Quality means long life to the appliance. But first what the prospect wants is long life to herself. A long life and a happy one!

Gadgets are good to attract attention. But relief from washing bother is the music the prospect wants to hear. So sing it to her in her own key, using her own kind of language, not that of the trade.

Savings?

But there are some savings a woman would rather make than money—her health, her back, her feet, her hands, her looks. That's what you have to sell anyway. Sell up to it. The savings you have to offer will overbalance the short-term saving of the first cost on the lowest priced model.

Forgotten them? Then here is a quick review of these savings, these word pictures of benefit, these inducements of relief from a hard job. Talk them first and use your gadgets, construction details, quality of manufacture and standing of the manufacturer as **proof** that these things can come true. They say **HOW** the washer or ironer makes these things possible. But tell her first **what** savings and advantages she can have if she buys from you.

The Washer

Clean clothing, irrespective of deliveries, anytime needed or wanted.

Save investment in clothes. They can be washed oftener if necessary.

Save the life of the clothes. Home treatment is gentler. Clothes last longer.

Children's clothes outgrown less often. They are worn and used more while they still fit. They are not away from use for several days each week.

Save lingerie or special clothes requiring care because of color or delicacy. Can be treated as they should be at home.

Saves the back. No scrubbing over a wash board.

Saves the hands. They need be in water less.

Saves the feet. Less time standing to do a big washing.

Saves time on washdays. It can be done quickly and be out of the way soon.

Saves in laundry cost. Despite claims to the contrary Electrical Development League of Southern California estimates a weekly saving for a family of 4 of $1.46 if laundry is done at home with electric washer and ironer. (Including interest on equipment cost and 10% depreciation.)

Treasured articles can receive especial care.

Ready for any emergency—extra company, or illness that requires extra laundering.

Summer play in cool, light colored clothes requires more washing. With a home laundry there is less expense and more pleasure.

Weak spots or worn garments can be favored and made to last a little longer.

Work clothes, overalls, and the like can be kept neat and clean. Husband will have a better appearance and a sense of pride in looking well.

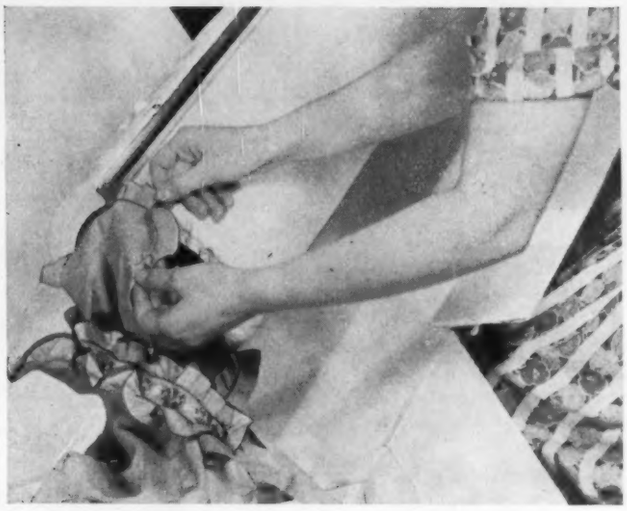
Pride in having most modern home equipment, with labor-saving and health protection.

Recommended by Your

THE MONTANA POWER CO. • UTAH POWER & LIGHT CO.
IDAHO POWER CO. • CALIFORNIA OREGON POWER CO.

Laundry Appliances

and profit come



The Ironer

Can sit down comfortably and do the ironing.

Saves the feet: No standing is required.

Saves the back. No tiresome bending over the ironing board, lifting a heavy iron.

Cooler. The heat does not rise right in the face as in hand ironing.

Look presentable should you have to answer the door or admit friends while ironing. Not tired looking and bedraggled from hand ironing.

Not restricted. Ironing can be done in any room. The ironer can be moved easily—not so the built-in ironing board.

Saves money in laundry bills and in home pressing of suits and other garments.

Less wear on clothes because they are less strained in being ironed at home.

Sweaters, knitted wear, velvets can be shaped and pressed.

Shrink yardage before dressmaking, at a saving.

Does better work. Professional touch is soon acquired. Linens are crisp and glossy, their patterns nicely revealed.

Less starch needed, which prevents scorching in ironing and cracking of the fiber in wearing.

Last pieces done as nicely as the first because you are not tired.

Curtains hang straighter and are easier to iron with the large surface of the shoe.

Moth larvae can be killed in clothing by running garments through the hot ironer.

Wet wash or rough dry laundry service can be used and ironing done at home at a saving.

Spare table (in table-top models) for use in the kitchen. (Folding or stow-away types are also available where space is limited.)

Completes the home laundry and is perhaps even more important to the health of the woman than the washer.

Tray Washer

Saves space on a crowded laundry porch, since the tray washer occupies no floor space, but fits over the tubs.

Saves a handling of water. Turn the faucet to fill the tub. Pull the stopper to drain it.

Handy for doing just a few things oftener, as it is always set up ready to wash. Prevents accumulation of a big wash.

Renters find it easy to move with them.

Spinner Models

Utmost safety in wringing of the clothes.

More water is extracted, permitting quicker drying and ironing. Saves time on washday.

More independent of drying weather out-of-doors.

Gentler on clothes, easier on buttons and other trimmings.

Blankets and pillows can be washed more easily and dried quicker. Save by home laundering of blankets and pillows.

to

keep a

steady flow of business

Sell

Home Laundry

Sales Allies —

PUGET SOUND POWER & LIGHT CO.
PORTLAND GENERAL ELECTRIC CO.
WASHINGTON WATER POWER CO.

What to do— to find the furtive Prospects —

Contrast of washer and ironer antiques and prices with new models—and effective display at Barker Bros., Los Angeles.

— for Washers

Where to find all these people who need new washing machines that statistics say exist—that is what any dealer wants to know. Sure, there are thousands of old washers needing replacement, thousands more to be sold to young brides just starting a home. But how to get them to the store for a demonstration and sale? Methods for doing just this have not changed. They are still the tested old ones, tried again. There's no short-cut, easy way to selling. But the use of the following does bring results. They are worth doing over and over again:

Constant demonstration at the store—machine running with colored fabric or rubber in the water. Advertised demonstrations. Laundry schools. Night demonstrations on special nights.

Canvass—Door-to-door, or following up door openers previously distributed. Using booklets as door openers, or other gadgets.

Users—Previous customers, calls on them to assure satisfaction and enlist their aid in finding other prospects among friends.

Letters and advertising—mailings with return postcards. Telephone directory ads. Used washer ads in classified sections. Advertising in the local papers. Radio spot announcements on local stations. Contests and prizes.

— for Ironers

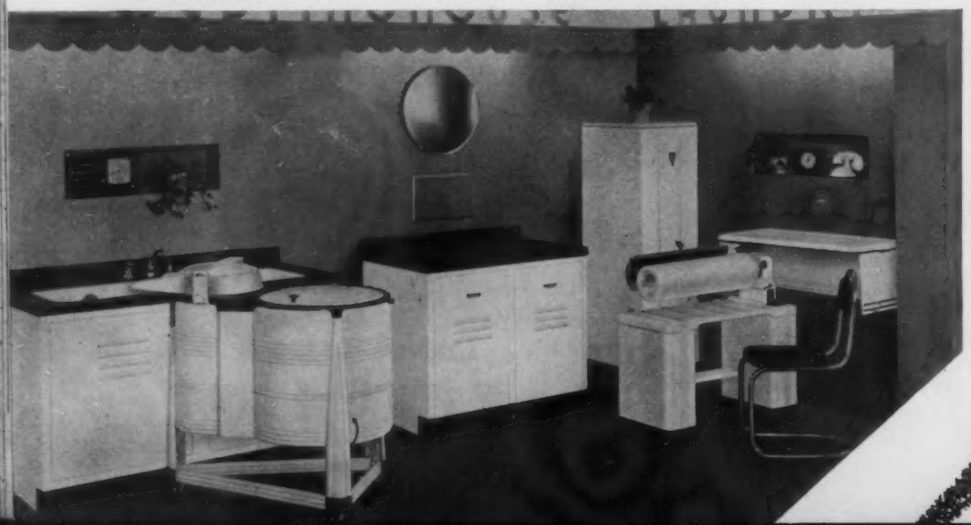
There's a difference between theory and hard reality on ironer possibilities. Theoretically every washer owner should have an ironer. The idea is to get her to think so too. Here are some ironer plans that have brought sales for dealers and salesmen:

An ironing party at the store, at which each one present takes a turn at ironing, with door prizes to bring attendance. A prospect's try-and-iron school, where salesmen can bring prospects to try their hand at ironing before committing themselves. (A high percentage are sold.)

Unusual demonstrations—by a blind person, a child, a man, a pickaninny, by blindfolded people, by a team of women—one doing ironing the old hard way, the other on an ironer—by card demonstrations in the window.

For the next generation—an ironing class for high school girls. Many will persuade their parents to buy now. Others will want one when they marry.

Guarantee of lessons at home, with own washing under home conditions. Free trial plan to washer customers of good credit. Ironer rental plan in which delivery and rental apply on purchase.



A complete electric home laundry has lots of appeal—and attention value. This by Westinghouse assists in selling of washer, ironer, water heater, radio, clock, cabinets and tubs—all profitable.

— and How

Utility Campaign

Montana Power Co. "Summery Cookery" promotion clicks

The Summer Cookery Campaign launched June 13 by the Montana Power Co. and allied dealers, is showing gratifying results, according to home office sales reports. Featuring the Eureka portable range, electric roasters and electric hotplates, the plan of the campaign was use of newspapers, backed by window banners, outdoor advertising displays and bill stuffers.

Display cards and window banners tied in with the national advertising campaign by the Modern Kitchen Bureau on this appliance. Booklets on "How to Sell Electric Roasters" were distributed to dealers and salesmen. A sales contest is also under way, with Montana Power salesmen and home service advisors entered. Conforming with the dealer coordination plan, equal credit is being given for dealer assists and company sales.

Bill stuffers sent to 83,331 Montana Power customers are featuring the Eureka portable range, Westinghouse roaster and White Cross and Universal hotplates. The last newspaper ad of the campaign will appear Aug. 8.

DEMONSTRATION WASHING in Turner's new Santa Ana store has been the key to washing machine sales volume, according to L. M. Turner, proprietor. A well-equipped room for washing clothes in the prospect's presence has been responsible for an average increase in washing machine sales of 600%. Employees take turns at doing their laundry in the store's wash room for demonstration purposes. Each man has his day in the week, from Turner himself through the group of salesmen. The floor of this room is carpeted to prove to customers that washing in the modern way is not sloppy or messy. Four of the leading makes of washers are sold, all leads being secured in the store, with no outside solicitors being employed.

THE EDISON G-E APPLIANCE CO., to provide even greater service to the many blind persons who purchase Hotpoint ranges each year, will issue, free of charge, a set of individual electric range instructions, in Braille, to every sightless person for whom a Hotpoint range is purchased. The instructions will be prepared by Miss Gretta Griffis, blind home economist, who has demonstrated the Hotpoint range throughout the country.

MONTHLY SAVINGS THROUGH QUANTITY BUYING AND WEEK-END SPECIALS (ESTIMATED)

Monthly Food Budget	Number of Persons in Family 2	3	4	5	6
$25 - $35.00	$2.54	$2.68	$2.87	$2.98	$3.09
35 - 40.00	2.87	3.04	3.28	3.40	3.51
40 - 45.00	3.08	3.22	3.45	3.56	3.68
45 - 50.00	3.33	3.49	3.73	3.86	3.99
50 - 60.00	3.87	4.15	4.45	4.66	4.86
60 - 70.00	4.33	4.66	5.00	5.23	5.48

MONTHLY SAVINGS THROUGH USE OF LEFT-OVERS AND PREVENTION OF FOOD SPOILAGE (ESTIMATED)

Monthly Food Budget	Number of Persons in Family 2	3	4	5	6
$25 - $35.00	$2.33	$2.46	$2.65	$2.77	$2.80
35 - 40.00	2.68	2.85	3.09	3.21	3.31
40 - 45.00	2.91	3.05	3.23	3.39	3.52
45 - 50.00	3.18	3.34	3.57	3.70	3.83
50 - 60.00	3.57	3.86	4.16	4.35	4.54
60 - 70.00	3.98	4.31	4.85	4.87	5.12

San Diego County Bureau of Radio & Electrical Appliances, by checking several national surveys, found that an electrical refrigerator can actually pay for itself in San Diego County. And what's more, return dividends on the investment! The chart above was made the "spark plug" of the Bureau's newspaper advertising during July

THE BUREAU OF ELECTRICITY, Alameda, Calif., has withdrawn from direct merchandising of electric ranges, water heaters and other major equipment. Since July 1, the Alameda Electrical Dealers Assn. has carried on the work with cooperation from the Bureau. This has been in the form of free wiring for electric ranges and water heaters and subsidizing 50% of the dealers' newspaper advertising costs on ranges and water heaters.

Wrap It Up!

Only in a salesman's heaven could it happen, but inhabitants of La Jolla, Calif., insist that it is heaven to live there. The La Jolla correspondent of the *News-Meter*, company magazine of San Diego Consolidated Gas & Electric Co. swears this is true:

"During a slack period the other afternoon something occurred which caused an intake of breaths. A little old lady wandered in and looked at the various appliances displayed. Then she edged over to the refrigerators and asked if people really liked using an 'electric ice box.' She was assured that no one could really get along without one after a short period of usage. She opened and closed the door of one of the fancier models once or twice, looked it over with an appraising eye and announced that she would take *two* of them. Moreover, she said that a friend of hers would be in the following day to take another 'just like the ones that I'm getting.' You just never can tell, can you?"

Sales Program

Mountain States Power Co. carries on complete campaign

H. A. Farris, salesmanager of Mountain States Power Co., has announced a sales promotion program for the remainder of the year. In a territory that serves customers in Idaho, Montana, Wyoming and Oregon, the company is at present running a mid-summer sales drive on electric ranges, refrigerators and water heaters.

During September and October especial attention will be given to electric ranges, and during the latter part of October, a campaign will begin on laundry equipment, which will carry through November. Lamp bulb sales promotion and lighting sales will also start in October, and around November 15th, radio sales will take the spotlight. All types of electrical merchandise will be featured during the following Christmas month.

In the range campaigns, planned promotion is set up with individual jobbers and manufacturers, with a special model range as a leader for their dealers. During these activities, Mountain States Power Home Service girls conduct small invitational type cooking schools for dealers.

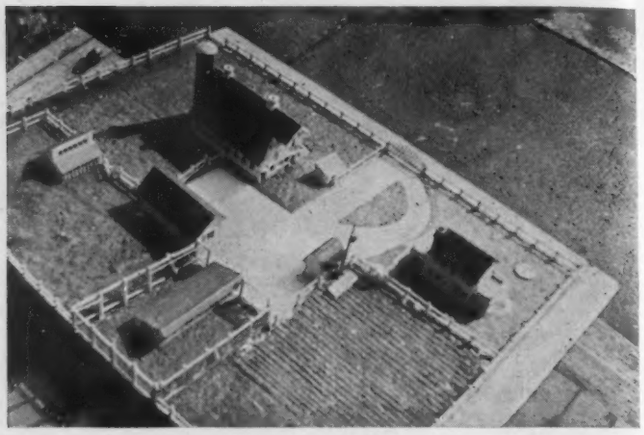
Through the earlier part of the year, the company used a newspaper and direct mail advertising program on laundry equipment and better lighting. During March, a complete study and analysis of customers' accounts were made for the purpose of furnishing dealers with prospect and mailing lists. Data books were also distributed to dealers. Electric ranges were featured through April and May, tying in with the Modern Kitchen Bureau national advertising. Water heaters were promoted in June and July along with a "June Bride" idea that sought to increase the sale of electrical service in the home.

Farris stated that there was a substantial increase in refrigerator sales throughout MSP territory as against last year. Range business is on a par with 1938, and in some districts shows an increase. Other equipment sales approximate '38 figures, according to Farris.

SERVICE SUPERVISOR Hazel McCarty's report on results obtained by classes in Ogden, Utah prospect schools shows they are a valuable aid in the sales of electrical equipment. To date, six schools have been held with an attendance of 118. Among these "pupils," five water heaters, five refrigerators and 30 ranges have been sold.

Model Shows Farmers Electric Values

By G. H. Bliesner



Model electrified farm used for demonstrations

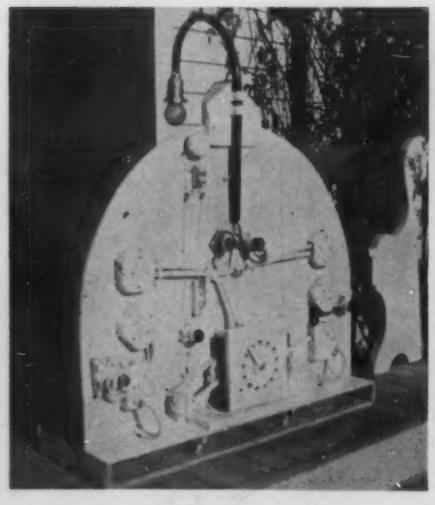
EFFECTIVE demonstration is one of the best methods of familiarizing the farmer with the advantages of rural electric service. Considerable success has been enjoyed with a model farm and demonstration kit which has been shown extensively before meetings of poultrymen, dairymen, 4-H Clubs, rural electrification men and agricultural college classes. With this equipment it is possible to demonstrate wiring techniques, losses due to inadequate wiring, motor types and operation, light intensity variation due to voltage drop, three and four-way switching and many other electrical features in which the farmer is primarily interested.

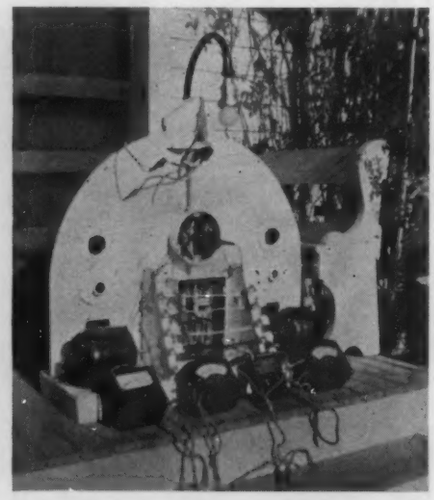
The model farm is shown in the accompanying illustration. It was built on a horizontal scale of 1 in. to 8½ ft. and a vertical scale of 1 in. to 7 ft. Many of the ideas incorporated in the farmstead were secured from USDA Farmers' Bulletin No. 1132. The author has available plans and a material list for the farm shown. The material cost was $11.98 and no record was kept of the labor involved. A similar model has been suggested as a satisfactory project for a rural electrification 4-H Club.

The demonstration kit pictured is mounted on a plywood board. The kit incorporates different types of wiring, a yard light, 3 and 4-way switches, a prony break for testing the two 1/6-hp. motors, door and window burglar alarm, fuses, a bell transformer, sentinel breakers for motor protection, a rheostat to provide voltage variations, two 1,000-watt heating elements and a socket for a conventional socket-type meter. In making the various demonstrations an ammeter, current transformer, voltmeter, wattmeter and sight meter are borrowed from the power company or from a college engineering department.

A wiring diagram for the kit accompanies this article. The approximate list price of all of the materials used in its construction is $61.89. Arrangement of the board may be varied to permit other demonstrations or tests.

Both front and rear of demonstration kit used to show rural electrical applications





With the equpiment on the board it is possible to show a number of misapplications as well as correct applications of electricity on the farm. Some of these are included in the following discussion.

The wiring of a farmstead involves different wire sizes, distances and loads. Inadequate wire sizes cost the farmer money due to losses on the line. A loss of 3.5 volts on a 20-volt service reduces the light intensity of a lamp approximately 10% with a 5% loss in kw.-hr. A 10% volt loss for a 220-volt motor decreases starting and maximum running torque approximately 20%, increases slip 25% and results in less efficient operation.

To demonstrate voltage loss it is assumed that two 1,000-watt brooders are connected in the brooder house 300 ft. away from the meter. The demonstration board is built with enough resistance connected in series in each wire equivalent to the resistance of 600 ft. of wire. Wire sizes range from No. 6 to No. 14. The voltage drop and resultant kilowatt-hour losses are shown in Table I. Using 240 volts for the 2,000 watt brooder load would decrease the loss to one-fourth of the present kw-hr. loss per month.

For single phase motor operation on the farm, the two types generally used are the split-phase, (low starting torque) and the repulsion induction (high starting torque). The later capacitor fractional horsepower motors have starting torques from 350-450% of full load torques, and have the advantage of not using any brushes. Repulsion induction motors are used for pumps, feed grinders, ensilage cutters, while split-phase motors are used for egg cleaners, washing machines and domestic refrigerators. A split-phase motor costs less but is seldom used above 1/3 hp. sizes.

The 1/6 hp. split-phase motor for this demonstration is from a washing

machine, and has the following characteristics: The no load running current at 120 volts is 4.2 amp., while the starting current required exceeds 20 amp. for approximately two seconds. The 1/6 hp. repulsion induction motor is from a domestic water pump, and has the following characteristics: The no load running current at 120 volts is 4.6 amp., while the starting current required is 7.5 amp. for less than a second. A split-phase motor will start loads from 115-275% greater than the motor's full load torque, while the repulsion induction motor will start a load from 200-500% greater than the motor's full load torque. Other tests show that a split-phase motor has a breakdown torque from 150-275% of full load torque, while a repulsion induction motor has a pull-in torque 200-250%, and maximum torque 225-250% of full load torque.

Motor protection is important for maximum motor life. Two sentinel breakers with 1/6 hp. heaters are used to protect the two motors. Fifteen or 30-amp. fuses in switch blocks for motor running protection are inadequate. Fusetrons specially built for fractional horsepower motors may be obtained, but must be installed so as to pass the state or national wiring codes. Deion or expulsion arc circuit manual or magnetic breakers are generally used to protect motors above one horsepower against overloads. Switch blocks with cartridge fuses are generally used for short circuit protection on motors.

Light intensity decreases due to inadequate wiring. A 3% voltage drop on a 120-volt connection reduces the footcandles intensity 10%, while a 10% drop reduces the intensity 30%. A shade or reflector over a light bulb often doubles the useful light intensity on a working surface. Different colored ceilings and walls affect reflected light considerably. The reflection factor of an ivory surface is 81%, while only 7% for dark shades of green or blue. Other factors in lighting design are to avoid glare and extreme contrasts. The average Mazda bulb has a life of 1,000 hours at normal voltage, but the efficiency of light output decreases considerably as the bulb is used. Light intensity also decreases as the square of the distance from the source. Variable light intensities are required depending upon the use of the light. Photo-electric cells are used in modern buildings to give a more uniform light.

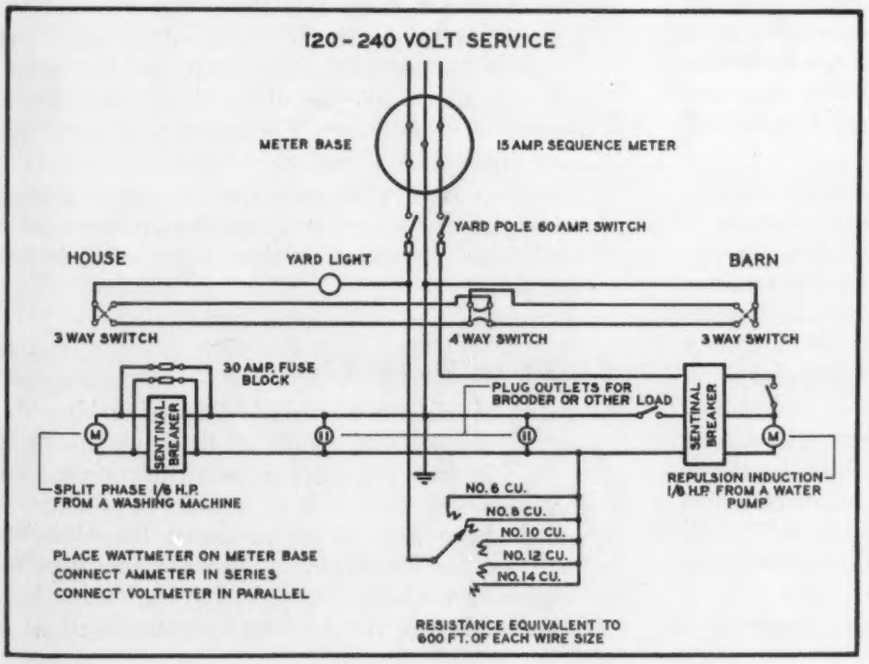
Yard light control from two or three locations on the farmstead saves the farmer money on his electric bill as well as helps to prevent accidents. In walking from the house to the barn, the farmer with a three-way control is able to turn on the yard light at the house and off again after the barn is lighted. With a four-way control and another switch the same yard light may be controlled from the poultry house or hog barn.

Equipment of this character is particularly adaptable to teaching 4-H Club boys the fundamentals of electricity and its proper application. Much work remains to be done in this field and the rural electrification specialist can perform a useful function in encouraging these future farmers to obtain both a practical and theoretical knowledge of electric power.

Table I—Losses Due to Improper Wire Size on Brooder Load

Wire Size	At Meter			At Brooder	
B. & S. Gauge	No Load Volts	Brooder Load Volts	Current Amp.	Volts	Loss kw.-hr. per Month 50% Load Factor
6	120	119	18	114	28
8	120	119	18	112	44
10	120	119	18	108	71
12	120	119	18	101	113
14	120	119	18	91	182

Wiring diagram for demonstration kit



Bears Learn

Electric fences protect mountain apiaries

Electric fences surrounding mountain apiaries in the Sierra foothills of California show great promise as a protective measure against bears which have a preference for honey produced in the hive. Tests conducted by members of the staff of the U. C. College of Agriculture prove that bruin shies away from a second shock just like any other animal.

Beekeepers in the central valleys of California have found it difficult to maintain their apiaries during the summer due to lack of forage, the presence of poisonous dust on crops and the prevalence of flowering buckeye in the foothills. Many of them have met this situation by moving the hives into the mountains during the summer season. However, in the mountains many apiaries have been raided and destroyed by black bears possessed of the proverbial "sweet tooth".

Possibility of protecting groups of hives by surrounding them with electric fences was proposed by members of the U. C. staff. Experiments were conducted in Yosemite National Park and in Lassen County which indicate that in most cases this method of protection is successful. As in the case with electric fences installed anywhere else, great care must be used to see that the installation is not hazardous to human life.

CHINCHILLAS, rarest of all fur-bearing animals (a full length chinchilla wrap for milady having in it 140 skins costs $80,000), are brought into the world in electrically-heated quarters on fur farms. Each nest in a breeding pen is equipped with a small heating element thermostatically controlled to maintain a temperature of 70 deg. F.

ELECTRICAL WEST

The All-Industry Magazine of Progress

Established 1887 and Incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity"

McGRAW-HILL COMPANY OF CALIFORNIA
68 Post Street, San Francisco

Contents Copyrighted

James H. McGraw, Chairman of the Board Howard Ehrlich, President
George C. Tenney, Vice-President and Editor
Wayne Snowden, Engineering Editor
R. A. Balzari, Publishing Counselor
Roy N. Phelan, Secretary-Treasurer & Manager
W. A. Cyr, Associate Editor
G. William Gahagan, Assistant Editor
Hans Hjorth, Typography

MEMBER AUDIT BUREAU OF CIRCULATIONS

ADVERTISING REPRESENTATIVES
Ralph H. Flynn, 330 W. 42nd St., New York
William B. Heaps, 520 N. Michigan Ave., Chicago
Roy N. Phelan, 883 Mission St., San Francisco
Stephen H. Babcock, Guardian Bldg., Cleveland, Ohio

EDITORIAL ADVISORY BOARD

UTILITIES: R. E. Fisher, Vice-President in Charge of Public Relations and Sales, Pacific Gas and Electric Company, San Francisco; J. A. Hale, Vice-President, Utah Power & Light Company, Salt Lake City; Glenn L. Jackson, Vice-President and Commercial Manager, The California Oregon Power Company, Medford; Frank McLaughlin, President, Puget Sound Power & Light Co., Seattle; L. T. Merwin, President, Northwestern Electric Company, Portland; W. C. Mullendore, Executive Vice-President, Southern California Edison Company, Ltd., Los Angeles . . . MANUFACTURERS: Vernon Brown, Vice-President, Square D Company, Los Angeles; W. R. Marshall, Vice-President, Westinghouse Electric & Mfg. Co., San Francisco; A. S. Moody, Northwest Manager, General Electric Company, Portland . . . WHOLESALERS: J. I. Colwell, Northwest Manager, Graybar Electric Co., Inc., Seattle; N. W. Graham, Graham-Reynolds Electric Co. Los Angeles . . . CONTRACTORS: Lloyd Flatland, Globe Electric Works, San Francisco; S. G. Hepler, Arrow Electric Co., Seattle . . . DEALERS: H. H. Courtright, President, Valley Electrical Supply Company, Fresno; J. C. Chamberlain, Sec'y-Mgr., Bureau of Radio and Electrical Appliances, San Diego.

Stop These Wars

FOR PLAIN stupidity and irresponsibility the electrical industry is plumbing new depths in some of its current price practices. Both buyers and sellers seem obsessed with a mania for self-destruction based upon a zeal to see who can purchase cheapest on the one hand, and who can sell at the lowest prices on the other. Outcome is an orgy of profitless operation, local and national price wars, general market instability and a host of other economic ailments. It is time for some sober reflection and a hearty dose of self-administered cathartic.

Several fundamental truths of sound business practice are being ignored which apply equally to buyer and seller. One of these is that the customer who asks for and receives unwarranted price concessions is inviting the ultimate destruction of the sources of goods which he must have to maintain his own business. To force a supplier to sell at a loss is to hasten the day when that supplier's organization must either fold up or institute a chain of vicious wage cuts, employee dismissals and other emergency measures which affect the general economy. Such tactics will neither restore nor maintain any kind of prosperity.

It is equally true that the seller who overreaches the bounds of legitimate price in his zeal to obtain business, destroys both the faith and the confidence of the customer in him and in his organization. In time he becomes branded as an enemy of sound business principles, an outcast whose tactics set him aside as a sharper and a cheat.

Furthermore, prevalence of price wars or market instability in any industry is an open admission of one or both of two glaring weaknesses. First of these is inability to sell constructively. No salesmanship is required when the seller steps into the market with his pocketful of extra fives. And in commodity markets such sales tactics fail to increase overall consumption. Only constructive selling can stimulate the demand for most of the electrical commodities in use today. A 50 per cent price reduction will not increase the quantity of electrical commodities in a building which is already engineered and designed for an adequate wiring installation. Creative selling of new or additional electrical uses or services will bring about an increase.

Secondly, unhealthy and unsound price practices indicate a definite lack of business statesmanship. All business has been stigmatized in the public eye for failure to adhere to reasonable ethics in the past. For any single industry to continue to ignore the basic rules of ethical operation is to invite government to step in with regulatory laws. And anyone familiar with the conduct of business today knows that there are too many laws on the statute books which have been conceived in fear and dedicated to the proposition that all business men are chiselers. Certainly there are no organizations in the electrical industry that are unwilling to subscribe voluntarily to an approved pattern of conduct.

Nobody will deny that the continuation of the present conditions in the electrical industry will seriously impede profitable operations. And everyone will admit that something should be done to correct the situation. Corrective measures can come from two directions—individual organizations can resolve to subscribe to sound pricing principles from now on, and the industry as a whole can determine to shun those who do not conform.

Light to Save Lives

"I COULDN'T SEE." Day after day this excuse is being offered by drivers involved in fatal night accidents on our streets and highways—if they live to testify at all. Some people have been prone to indict the electrical industry for its failure to provide facilities for improving visibility for night driving. There have been conflicting views in the industry itself as to

wha tsteps should be taken to do this job. Others have claimed that the automobile people are at fault. However, the real blame rests largely with the public itself. Until public complacency is overcome and public opinion aroused, progress will be slow.

Because of this the industry can look with satisfaction upon the campaigns just completed by units of the Junior Chamber of Commerce in all parts of the country. Safety committees of this organization brought the story of light for safety to millions of people. Notable work was done in the West. The San Francisco Jr. C. of C. placed third in national competition. Other Western groups were well up toward the top. Out of this campaign has come plans for immediately lighting or relighting some of the worst danger spots.

EEI States Its Case

IF IT lives long enough, the light and power group of the National Electric Code committees may yet learn to put the horse in front of the cart. Had it presented the case it has just now prepared for consideration by inspectors and the industry of its proposed code changes before making the proposals themselves, the wave of protest and misinterpretation of its motives that followed might have been avoided. And its proposals, based on logic and field experience, might have advanced farther toward adoption than otherwise.

At the request of the International Assn. of Electrical Inspectors the EEI finally sent a well documented case for its proposals to all members. The proposals advocate, briefly, use of larger copper in old conduit by employing new thinner walled insulated wires, more extensive use of bare neutral or covered neutral, and use of a new concentric house wire cable. To the industry at large it has three more publications setting forth its reasoning on behalf of these new ideas.

Eventually these propositions will rise or fall depending upon whether they really are practical and sound. Any new idea has to stand such a test. The junk dealers will finally get the materials that have failed to meet such tests, and those that are accepted will continue to be used for long years. But the pity is that EEI allowed itself to set up psychological resistances to its propositions, resistances which must be patiently removed by more of the new attitude it has taken in these recent publications. Instead of presenting these proposals as potential improvements in the art worthy of cooperative solution, the original method used to introduce them brought suspicious searching for hidden motives that probably never existed. This was unfortunate and unnecessary. It has probably slowed up the orderly process of consideration of the proposals which otherwise might have followed.

Engineering alone is not the deciding factor in so emotionalized a subject as wiring. The human factors involved take human understanding and appreciation. Perhaps a dash of salesmanship, certainly of diplomacy, is always a necessary adjunct to any worthy project.

Cavalcade of Conventions

THANKS to the beauty and charm of the Golden Gate International Exposition this year the West is favored with an unprecedented number of important conventions and conferences. The month of August brings four significant events of this caliber within a two-week period.

First comes the joint meeting of both the Northwestern and Southwestern Sections of the International Assn. of Electrical Inspectors for the second time in their histories to meet together. With a program arranged to permit vacationing delegates to see as much of the Fair as possible, mornings only will be devoted to the meetings. In 1940 a new edition of the Code comes out. Far-reaching modifications have been submitted. Inspectors will have these to pass upon, tempering them with their intimate field experience.

Never before has the Illuminating Engineering Society brought a convention west of Milwaukee. This year it comes to San Francisco during the week of Aug. 21-25. Graciously many prominent westerners were accorded places on the program. The national and international figures in illumination that this convention will bring West should attract to this convention lighting men from this region who have never before enjoyed the opportunity to attend an IES convention.

To catch many of those attending both the IES and the Inspectors conventions interested and active in adequate wiring promotion the National Adequate Wiring Bureau will call its first conference between the two. As the inspectors close their sessions the wiring conference will convene, Aug. 17, 18 and possibly 19. Practical round-table exchange of ideas and methods for adequate wiring promotion will benefit all who attend and reflect itself later in more electrical comfort for the public.

Finally managers of leagues and bureaus will get together for a similar exchange of ideas and methods.

August promises to be a seminar of more than ordinary convention importance.

IES

Westerners prominent on program of national convention in S.F.

FIRST opportunity to attend a national convention of the Illuminating Engineering Society near home will be afforded westerners when the IES brings its convention to San Francisco Aug. 20-25. Five days instead of the usual four, the convention brings with it also the National Lighting Sales Conference program on Thursday afternoon and Friday morning. It is in the latter that the strictly engineering phases of illuminating engineering are translated into their sales opportunities.

The program includes many westerners and some of the most famous names in illuminating engineering. Lighting at both fairs will be described, and on Monday evening a reception and dinner at Treasure Island's Yerba Buena Club will precede a tour of the grounds to see the special lighting designed by A. F. Dickerson, of GE, Schenectady. Trips to the illuminating laboratory at Stanford and to that of the cyclatron at University of California are included also. A special train from Chicago brings a large party of Eastern delegates via Los Angeles, where the Southern California Chapter will entertain and tour them.

In detail the program is outlined as follows:

Monday, Aug. 21

MORNING—L. H. Graves, vice chairman.

Welcome, by R. E. Fisher, Pacific Gas and Electric Co., San Francisco. President D. W. Atwater, Westinghouse Lamp Co., Bloomfield, N. J., address. General secretary Howard M. Sharp, Buffalo, Niagara & Eastern Power Corp., Buffalo, report.

"Lighting the New York World's Fair," R. C. Engelken, Morgan, Hamel & Engelken.

AFTERNOON—R. G. Dummel, chairman.

"How New York World's Fair Exhibitors Use Light," Samuel G. Hibben, Westinghouse Lamp. "Exterior Illumination of Golden Gate International Exposition," A. F. Dickenson, GE, Schenectady. "Electric Supply and Inside Lighting for Golden Gate Fair," Wm. P. Bear, P. G. and E.

EVENING—Cocktail party—supper at Yerba Buena Club, Treasure Island, and inspection of lighting at Fair.

Tuesday, Aug. 22

MORNING—Laboratory session—W. F. Little.

"Design of Photoelectric Flicker Photometers," Parry Moon and D. P. Severance, MIT, Cambridge, Mass. "Photoelectric Photometer for Rapid Transmission of Two Light Sources," F. A. Ryder, J. T. Gier, L. M. K. Boelter, UC, Berkeley. "Mechanical Integrator for Determination of Illumination from Diffuse Surface Sources," V. H. Cherry, D. D. Davis, L. M. K. Boelter, UC. "Electrical Characteristics of Low Pressure Discharges," John W. Marden, George Meister, Westinghouse Lamp. "Demonstration Lecture—Water-cooled Capillary Mercury-Vapor Lamps," Cornelis Bol, physics dept., Stanford.

MORNING—General session—L. A. S. Wood.

"Mechanics of Light Flux Control by Plastics," A. F. Wakefield, Wakefield Brass Co., and M. H. Bigelow, Plaskon Co. "Brightness-Contrasts in Seeing," Matthew Luckiesh and Frank K. Moss, GE, Nela Park. "Specification Points of Brightness," H. L. Logan, Holophane Co. "Artitficial Daylighting Studies," Dorothy Nickerson, Bureau of Agricultural Economics, US Dept. Agriculture.

AFTERNOON — Inspection Stanford University.

EVENING—European Lighting & Progress. G. Bertram Regar, chairman.

". . . and the Dissemination of Knowledge Relating Thereto," in Europe—C. A. Atherton, Phoebus S. A., Compagnie Industrielle pour le Devloppement de l'Eclairage. "New Developments in Lighting Abroad," Willard C. Brown, GE, Nela Park. "Progress Report," O. P. Cleaver, Committee on Progress, Westinghouse Lamp.

Wednesday, Aug. 23

MORNING—Highway Lighting, F. V. Westermaier.

"Traffic Safety Lighting," (report) L. A. S. Wood, Westinghouse E. & M. Cleveland. "Evaluation of Street Lighting," Kirk M. Reid and H. J. Chanon, GE, Nela Park. "Silhouette Seeing with Motor Car Headlamps," V. J. Roper and K. D. Scott, Nela Park. "Highway Illumination — Measurements of Auto Headlamps," D. D. Davis, F. A. Ryder, L. M. K. Boelter, UC.

MORNING—Natural Lighting—H. J. Mayo.

"Light Transmission Louvers for High Speed Vehicular Tunnels," Romaine W. Myers, Oakland. "Control of Natural Light in Schoolrooms," Leland H. Brown, Stanford. "Analysis of Photoelectric Classroom Lighting Control," D. P. Caverly, Hygrade-Sylvania Corp. "Daylight Variations," H. L. Johnston, Duquesne Light Co., Pittsburgh.

AFTERNOON—Trip to Cyclatron laboratory.

Cavalcade of

1 IES comes to San Francisco for its first far west convention, Aug. 21-25.

2 INSPECTORS—Two western sections join in meeting again, Aug. 14-17.

3 FIRST WIRING CONFERENCE follows inspectors, Aug. 17-19.

4 LEAGUE MANAGERS wedge in a conference, Aug. 17, a.m.

5 CONTRACTORS plan California convention, Asilomar, Sept. 22-3.

EVENING—Banquet and Ball, Fairmont Hotel.

Thursday, Aug. 24

MORNING—General session — A. D. Cameron.

"Lighting Detroit Edison Co. Service Building," H. A. Cook, Detroit Edison. "Fluorescent Lamps and Their Applications," A. B. Oday and R. F. Cissell, GE, Nela Park. 'Practical Aspects of Farm Home Lighting," Myrtle Fahsbender, Westinghouse Lamp. "Survey and Analysis of Present Home Lighting," E. W. Gommery, GE, Nela Park. "Lighting Digest," Walter Sturrock, GE, Nela Park.

AFTERNOON — Herbert H. Webb, chairman.

"Developing a United Front in Lighting Sales," C. T. Bakeman, Puget Sound Power & Light, Seattle. "Four Years of Light for Living," Howard Sharp, Buffalo. "School Lighting and the Acquisition of Intelligence," A. W. Ray, Supt. of Schools, Sausalito, Cal. "RLM Specification and Certification Plan," Rudolph W. Staud, President RLM Institute, Benjamin Elect. & Mfg. Co.

Friday, Aug. 25

MORNING—Howard M. Sharp, chairman.

"Fluorescent Lighting from a Sales Standpoint," J. Reed Hartman, Cincinnati Gas & Electric Co. "Application of Fluorescent Lamps," C. S. Woodside and J. T. Bailey, Westinghouse Lamp. "Lighting orums," Frank A. Hansen, Western Institute of Light and Vision, Los Angeles. "Protecting the Consumer with Certified Lighting Equip-

ASSOCIATIONS

# of Events

6 RMEL convention at Estes Park to celebrate Light's 60th anniversary.

7 NORTHWEST ACCOUNTANTS see the King and at Vancouver meeting.

8 NWEL&P Officers and committees fir the year are named.

9 PCEA likewise names year's committee organization.

10 AGENDA of other association meetings, in brief.

ment," William F. Little, Electric Testing Laboratories. "Developing Commercial Lighting in an Extended Territory," L. B. Gawan, Utah Power & Light, Salt Lake City.

The convention will be held in the Fairmont Hotel, San Francisco. Convention committees are headed by O. R. Doerr, PG and E., with John Erikson, Fred Wellhouse, W. P. Bear, E. C. Wood, Gil Trosper, W. A. Cyr, H. L. Gardner, W. Wuelker, and Mrs. Doerr heading committees.

Inspectors

Final plans include one change and all-industry banquet.

Banquet of the electrical inspectors, meeting in joint session for the second time in their histories, will become an all-electrical industry affair, Wed., Aug. 16, at Bal Tabarin, San Francisco. Northwestern and Southwestern Sections, International Assn. of Electrical Inspectors, meet in joint convention at Hotel Empire, San Francisco, Aug. 14-17. But the usual dinner-dance becomes an all-industry affair, although informal, and committees representing the other branches of the industry are busy making arrangements for this particular affair.

The program of the inspectors convention, outlined last issue, is devoted largely to discussions of the proposed changes to the National Electric Code to be made in the 1940 edition. Very few speakers are on the program, most of the time being set aside for code examination. Meetings will be held in the evenings free for visitors to the Fair.

One change has been announced in the program, according to Harold L. Gerber, secretary of the Southwestern Section. H. J. Morton, representing the Edison Electric Institute, will be the speaker at a special joint meeting of the convention and the San Francisco Electrical Development League, at noon, Monday, Aug. 14.

Wiring Conference

Two-day round-table on promotion follows inspectors

National Adequate Wiring Bureau is calling the first of a series of wiring conferences in San Francisco immediately following the joint convention of the electrical inspectors. Taking advantage of the fact that many who are active in the promotion of adequate wiring will be in that city for either the inspectors' or the IES convention, O. C. Small, secretary of NAWB hastened arrangements for a conference on wiring sales and promotion.

Arthur Schanuel, field representative of NAWB will be in charge of the meeting, held probably in P. G. and E. Auditorium, 245 Market St., San Francisco, Thurs. afternoon, Aug. 17, that evening, and Fri., Aug. 18. Ralph W. Wiley, chief of the San Francisco Department of Electricity, has accepted the chairmanship of the meeting. George W. Barker, manager, Pacific Coast Electrical Bureau, Northern California Division, has been asked to handle the local arrangements.

Topics to be discussed in round-table fashion include: The work of the adequate wiring promotion man on new home construction, industry cooperation; Utility promotion and service; General promotion and service contacts; The certification plan; National bureau promotion and services; and other subjects relating to the details of handling this type of activity successfully.

League Managers

Again to make the most of an opportunity afforded by the IES and Inspector conventions and the wiring conference, a meeting is being arranged in San Francisco for managers of leagues, bureaus, societies and other promotional associations. This meeting will be held Thursday morning, noon and early afternoon, Aug. 17, just prior to the wiring conference, probably at the P. G. and E. building, 245 Market St., in a committee room.

Intimate discussion of management problems, details of handling promotions and campaigns, exchange of ideas and of experiences that may help other league managers to avoid mistakes or difficulties will be carried on informally. A similar meeting was called by ELECTRICAL WEST at Fresno in March, 1938 and proved beneficial.

Contractors

Plan statewide meeting at Asilomar in September

Clyde L. Chamblin, San Francisco electrical contractor, flew to Hot Springs, Va., to a meeting of the labor relations committee, National Electrical Contractors Assn., of which he is Div. 9 representative. With him he took the membership list of the San Francisco Electrical Contractors Assn., 130 in total, to apply for a charter as a chapter of NECA, becoming its largest single chapter and most representative.

On his return former NECA president Chamblin stopped at Los Angeles, after a visit with Dan Tracy, national president of IBEW in Washington. All labor problems of NECA and IBEW are now to be resolved peacefully in a joint labor relations board.

Arrangements were tentatively made for another statewide meeting of electrical contractors from all parts of California in September, probably at Asilomar, near Monterey, Sept. 22-23. At that time Paul Geary, recently appointed NECA labor relations coordinator will make his initial trip to the coast. Ken Ryals, president of Electrical Contractors Assn. of Northern California is heading up the committee.

RMEL

The sixtieth anniversary of the birth of the incandescent lamp, which it is claimed, was perfected by Thomas A. Edison while on a sojourn in Rawlins, Wyo., will be the keystone of the Rocky Mountain Electrical League's annual convention. The affair will be held in the Stanley hotel, Estes Park, Colo., September 7-9.

Coupled with the anniversary celebration will be a salute to the electrical pioneers of the Rocky Mountain region, so many of whom were identified with the first applications of incandescent lamp illumination and other early-day developments in the electrical field.

The program for the annual powwow of the "Kee-Lo-Watt tribe," as the League is known, is in its final stages, according to manager George E. Lewis. Every branch of the industry's foremost activities will receive attention, includ-

PRINT IN BINDING

ing adequate wiring, Better Light-Better Sight, Kitchen Modernization, power sales, merchandising in all its aspects, engineering, accounting and advertising. Several speakers of national repute already have accepted places on the program to cover the foregoing subjects.

On the evening of the annual banquet there will be a series of old-time dances, the sort that were the vogue when the incandescent lamp was cradled. Many of those in attendance will wear costumes of by-gone days, for the best of which League president W. N. Clark will award prizes.

PCEA

Personnel to operate the various sections and committees of the Pacific Coast Electrical Assn. during the administrative year 1939-40 has been named by President W. W. Glosser. Also, two PCEA vice-presidents have been named by the board of directors—K. M. Ryals, Stone-Ryals Electric Mfg. Co., San Francisco, and C. E. Houston, Southern California Edison Co., Los Angeles. Major committee appointments are as follows:

Membership Committee: S. E. Gates, General Electric Co., Los Angeles, chairman; A. E. Strong, Coast Counties Gas & Electric Co., Santa Cruz, vice-chairman.

Operating Economics Section: A. G. Jones, General Electric Co., San Francisco, chairman; H. A. Noble, San Diego Consolidated Gas & Electric Co., San Diego, vice-chairman.

Business Development Section: F. C. Todt, General Electric Supply Corp., Los Angeles, chairman; E. G. Stahl, San Joaquin Power Division, P. G. and E., Fresno, vice-chairman.

Administrative Services Section: M. W. Phillips, Southern California Edison Co., Visalia, chairman; E. A. Long, Pacific Gas and Electric Co., San Francisco, vice-chairman.

Red Seal and Ordinance Committee: C. E. Heise, Westinghouse Electric & Mfg. Co., San Francisco, chairman; D. E. Harris, General Electric Supply Corp., San Francisco, vice-chairman.

NWEL&P Assn.

J. E. E. Royer, vice president and general manager of the Washington Water Power Co., Spokane, was elected president of the Northwest Electric Light & Power Assn. at its 32d annual meeting in Portland, Ore., June 23. He succeeds LeRoy A. Grettum, Eastern Oregon Light & Power Co.

C. J. Strike, president of the Idaho Power Co., Boise, was named vice-president. State vice-presidents elected were as follows: Idaho, John D. Orr, Idaho Power Co.; Montana, R. O. Kerr, Montana Power Co.; Oregon, O. B. Coldwell, Portland General Electric Co.; Utah, W. A. Huckins, Utah Power & Light Co.; Washington, Frank Walsh, Puget Sound Power & Light Co.; British Columbia,E. H. Adams, B. C. Electric Railway Co.

Members-at-large on the executive committee elected were Walter J. Dennis, Northwestern Electric Co., Portland; J. C. Platt, Edison G-E Appliance Co., Seattle; Lyle G. Fear, Westinghouse Electric & Mfg. Co., Portland. Hold-over terms on the executive committee are held by Hance H. Cleland, president of California Oregon Power Co., Medford, and LeRoy A. Grettum.

Royer announced the appointment of Berkeley Snow, Portland, as executive secretary, and the following section chairmen: accounting and business practice, R. W. Lawlor, Northwestern, Portland; business development, C. Patrick Johnson, Puget Sound, Seattle; engineering and operation, Paul P. Ashworth, Telluride Power Co., Richfield, Utah.

Accountants of the Northwest Electric Light & Power Assn. met for their 14th annual meeting at Vancouver, B. C., May 26-27, under the chairmanship of S. A. Horner, B. C. Electric Railway Co. Seventy-five members were present for the discussions which embraced internal auditing, employee training, payroll procedure to comply with the wage and hour law, original cost as a basis for reclassification of property accounts, and depreciation. E. H. Adams, vice-president, B. C. Electric Railway Co., welcomed the delegates, and Berkeley Snow, executive secretary of the Association, responded.

The necessity for training employees engaged in the credit and collection departments and ways and means of accomplishing this training were forcefully brought out by R. W. Peterson, Puget Sound Power & Light Co. Paul R. Enright, Eastern Oregon Light & Power Co., discussed the impossibility of accurately measuring "lost service value" through the straight line method of accounting for depreciation. Methods of keeping a continuing internal audit in the accounting procedure of the company were outlined by D. G. White, B. C. Electric Railway Co.

Much interest was displayed in round table discussion of payroll procedure with respect to the wage and hour law, led by F. C. Bash, The California-Oregon Power Co., and on original cost as a basis for reclassifying property accounts, led by R. W. Lawlor, Northwestern Electric Co.

Lighter moments were supplied at the annual banquet and trips to many points of interest in the vicinity of Vancouver. The opening of the new Hotel Vancouver just prior to the meeting and the impending visit of Great Britain's King and Queen, lent special interest to these features. L. J. Lascelles, B. C. Electric Railway Co., was chairman of arrangements.

Plan Electrical Day at Fair, Sept. 16

Celebrating the major part that electricity has played in the success of the Golden Gate International Exposition, Electrical Industry Day will be made a "colossal" event, Sept. 16. Conceived by Carl Severin, electrical contractors' president, J. B. Black, PG and E will be honorary chairman; Clyde Allen, president of S. F. Electrical Development League, coordinating chairman; R. E. Fisher, PG and E, program chairman; R. M. Alvord, G-E Co.; Al Nicoll, Graybar; J. Scott Milne, IBEW; and others on active committees. Special events contemplate an industry meeting, a reception, and grand ball. Groups from all parts of the West will be invited to participate. Details will be publicized

Agenda

Doings and plans of western electrical associations

Through the summer months, western electrical clubs continue to carry on their activities. Listed are the programs of a few:

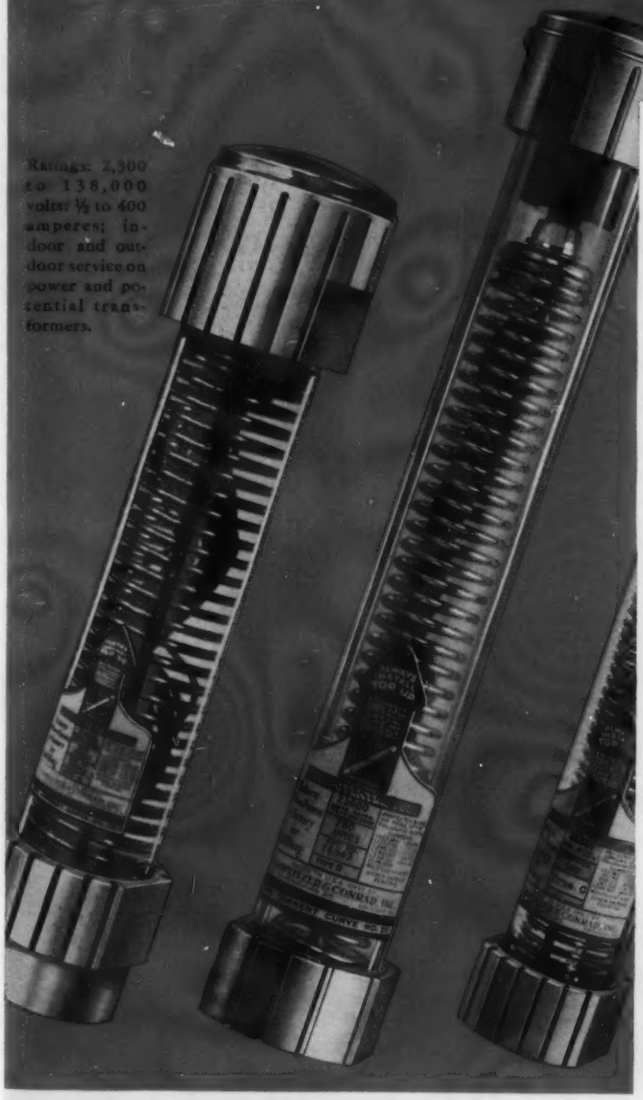
Electrical Contractors and Dealers Assn., San Joaquin County—Regular meetings 2d Monday of each month.

Electrical League of Utah—Meeting June 1 devoted to League's Adequate Wiring Committee report. Ogden Division League Office gathering was held in Ogden Power Co. auditorium June 13. League's annual outing will be held Aug. 16, at Lagoon, Utah, when all electrical concerns will enjoy a half-holiday.

Santa Barbara Chapter, NECA—Inspector H. Dobson talked on proposed changes in electrical code as sponsored by the Edison Institute at June 22d business meeting. Meetings were held July 13 and 27, with others scheduled for Aug. 10 and 24.

Southern California Chapter, IAEA—Next meeting is to be held Nov. 15, at City Hall, Torrance, at which time inspector problems are to be discussed.

THERE ARE MORE S&C LIQUID FUSES BEING PUT INTO USE TODAY THAN EVER BEFORE



Ratings: 2,300 to 138,000 volts; ½ to 400 amperes; indoor and outdoor service on power and potential transformers.

● The increasing use of S & C Liquid Fuses is a result of proven dependability—proven maximum protection.

Improvements that are continuously being made, mean lower OVER-ALL system protection costs,—fewer replacements, and provide still greater reliability.

Power companies are using them in more places on their systems, and to a greater extent, because they provide:

1. Unusual accuracy over entire range of fault currents from minimum blowing current to maximum capacity of fuse.
2. Fast, positive clearing of short circuits.
3. High interrupting capacity.
4. Visual inspection of condition without removal from circuit.

SCHWEITZER & CONRAD, Inc.
4435 Ravenswood Avenue Chicago, Illinois
Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Ontario

LIQUID FUSES

"EXPERIENCE WILL CHOOSE THE S & C FUSE"

WESTERN REPRESENTATIVES: SAN FRANCISCO, George E. Honn; LOS ANGELES, Farnham & Cunningham; SEATTLE, T. S. Wood; SALT LAKE CITY, Riter Engineering Co.

NEWS OF THE INDUSTRY

PUGET SOUND POWER FIGHTS PUDS WITH RATE CUT

Said to be the largest single electric rate reduction in Washington's history, the Pugent Sound Power & Light Co. has declared rate reductions beginning September 1, that will mean an annual savings of $700,000 to Puget Sound customers.

It is pointed out that the slashing cut in Puget Sound Power, especially heavy in the rural districts, may cause a drastic revision of Public Utilities District's plans to acquire the private company's system piece-meal for public operation. Ferd Schaaf, State Public Works Director, pointed out that the reductions will benefit primarily small users of electricity, but that large users will also profit.

Schaaf's statement shows that Seattle residential and commercial rate payers will benefit about $184,000 annually; outside Seattle in the territory served by the company, residential and commercial customers will profit $510,000 yearly; schools, halls, churches and power used by farmers for spraying will effect a saving of $6,000. The new rate schedules for residence, farm and commercial customers approach closer than ever before the Seattle rates.

City Council President James Scavotto scouted any suggestion that a sweeping City Light rate reduction might impair strength of bond issues floated by the Department, pointing out that in the past any rate reduction, after a brief period, resulted in much greater revenue for City Light, due to increased use.

The Puget Sound Power Company's new rate schedule is as follows:

Seattle metropolitan area: first block of 40 kilowatt hours a month cut from 5 cents to 4½ cents a kilowatt hour for residences, commercial lighting service and schools, halls and churches.

Rural territory: *residential,* first block of 40 kilowatt hours reduced from 5 to 4½ cents; second 100 kilowatt hours from 3 to 2½ cents a kilowatt hour; additional blocks unchanged; minimum of one cent for all over 240 kilowatt hours.

Rural territory: *commercial lighting:* first 40 kilowatt hours reduced from 5 to 4½ cents; next 60 kilowatt hours, reduced from 4 to 3½ cents; and third block of 500 kilowatt hours reduced from 3½ to 3¼ cents a kilowatt hour.

Rural territory, schools, halls and churches: First 40 kilowatt hours, reduced from 5 to 4½ cents; second 100 kilowatt hours, from 3 to 2½ cents.

Rural territory, farmers' spray power service: reduced approximately 10 per cent.

Attorney Rolla V. Houghton, connected with the formation of public utility power districts in the counties throughout the state, said that the power company's reductions could be regarded as a direct result of the formation of the Public Utility Districts, but that he did not regard the reduction as a "blow" to the districts which plan to buy private power company properties within their counties.

Blue Havasu

Official confirmation was received last month by the Metropolitan Water District of Southern California from the office of Secretary of the Interior Ickes, stating that the Indian name of Havasu, "Lake of the Blue Waters," had been adopted as the designation for the body of water created by Parker Dam.

Extending upstream for 50 miles from the point where the Colorado River is blocked by Parker Dam, Lake Havasu was named by an old Mojave Indian, Haranai, who has spent his entire life on the Colorado River.

Lake Havasu will furnish billions of gallons of water daily to the 13 cities which comprise the Metropolitan Water District.

SKAGIT PUD PURCHASES $300,000 PROPERTY

The Skagit Public Utility District has purchased the property of the Peoples' Oil & Gas Co., Mount Vernon, Washington, for a reported price of $300,000, according to an announcement made by John Wylie, president of the Skagit organization. The Skagit PUD has operated water systems in Mount Vernon, Sedro Woolley and Burlington. The purchase price will be covered by the issuance of 30-year revenue bonds.

WASHINGTON COURTS KEEP ON HUMMING

Right of Public Utility Districts in Washington to piecemeal condemnation and acquisition of private utilities was upheld July 27, when Judge John C. Bowen of the Federal Court in Seattle ruled in favor of the petition of Whatcom County. This Public Utility District No. 1 had sought the condemnation of Puget Sound Power & Light properties.

Judge Bowen also ruled that the district could condemn property owned by Puget Sound within Bellingham (Wash.) city limits without seeking the city's permission. The city had intervened before in behalf of the power company rights.

July 31 was set as a date for signing a decree which will pave the way for court proceedings to determine the value of the condemned property.

Puyallup Acts

Unperturbed by the drastic declared cuts in power and light rates by the Puget Sound Power & Light Co., the city council of Puyallup took the first step to condemn all the company's property in the city and set up a municipal light and power system. The council has given first reading to an ordinance calling for a special election September 12, to decide whether the city shall issue $350,000 in bonds for purchase or condemnation of all power facilities of the private company within Puyallup.

The action by the Puyallup council was taken despite a letter of protest from Frank McLaughlin, president of Puget Sound, and over the verbal protest of A. M. Chitty, Olympia, private company division manager. Chitty told the councilmen the contemplated move might result in higher rates for Puyallup residents if the city went into the power business. He pointed to the many rate reductions in Puyallup brought about by the private company, such as the cut of residential rates for the first 60 kw. hours from 8 to 4½ cents.

Chitty also pointed out that the company now pays $9,400 a year in taxes in Puyallup, which sum will have to be made up by other taxpayers; he also cited what his company is doing to build up the farming area adjacent to Puyallup by ex-

Announces

A NEW LINE OF MULTI-BREAKERS

beginning at

$2.00 LIST PRICE

TYPE MO MULTI-BREAKER. Illustration actual size.

Wiring is easy because the breaker is mounted on inside of cover.

At these new low prices, the door is wide open for universal use of circuit breakers. This smaller Multi-breakeR is rated at 15, 20 or 25 amperes, 115 or 115-230 volts, A.C. It is available in single or double pole, with or without neutral, surface or flush mounting.

The new double pole Multi-breakeR is ideal for water heater service. It is non-tamperable; the handle may be sealed in "off" position and provision is made for sealing the box cover where required. Sealing the cover meets with no customer objection because the breaker is re-set by a simple movement of a lever.

Standardize on the new Type MO Multi-breakeRs for your water heater campaigns. They have a very definite customer appeal. Of prime importance to Power Companies, they eliminate needless service cost. All Square D distributors are now stocking them.

CALL IN A

SQUARE D COMPANY

LOS ANGELES - MILWAUKEE - DETROIT

IN CANADA: SQUARE D COMPANY (CANADA) LIMITED: TORONTO, ONTARIO

SQUARE D MAN

ATTRACTIVE NEW ARVIN

Profit Makers

What you need to Sell Heaters

FOR: Bathrooms . Nurseries . Dens . Guest-rooms . Game-rooms . Sun-rooms . Trailers and Camp Cottages . Invalids' Rooms in Homes or Hospitals . Small Offices and Ticket Booths . Hair and Clothes Drying . Bath Houses . Photographers' Drying Rooms.

For Baby's Bath and other uses where extra or temporary heat is needed.

These new Arvin profit-makers are being featured in a consumer advertising campaign this fall and winter. National magazines such as Good Housekeeping, Better Homes and Gardens, and The American are being used. Order Arvins from your jobber now and cash in on the demand.

NOBLITT SPARKS INDUSTRIES, Inc., COLUMBUS, IND.

Also Makers of Arvin Car Heaters and Radios

DELUXE MODEL 201A
IVORY AND MAROON ENAMEL FINISH, CHROMIUM GRILLE
$10.50 LIST

DeLuxe Model 201 Tan and Brown Morocco Finish, Chrome Grille **$9.50 List**

Two Deluxe models are identical except for finish. Toe switch makes it easy to turn heater on and off. Red indicator light, inside case, gives "fireplace glow" when heater is on—warns against leaving it on when not desired. Operate on AC only, 50 to 60 cycles, 110 to 125 volts. Use 11 amps. at 110 volts. Nichrome helical heating element. Heavy gauge metal case on rubber feet. Induction type motor. Two-blade propeller fan. Carrying handle in back with air intake louvers. Rubber plug and 6 feet of HPD cord. Size—11¾" high, 10⅜" x 6⅝" at base. Weight each, 9¾ pounds.

ARVIN *Circulating* HEATERS

ELECTRIC FAN-FORCED

Low-Priced Leaders

STANDARD MODEL 101 — **$7.50 LIST**
TWO-TONE GREEN ENAMEL FINISH
Size 10" high, 9⅛" x 6⅛" at base

JUNIOR MODEL 50 — **$5.50 LIST**
GREEN MOROCCO FINISH
Size 7½" high, 6¼" x 10" at base

SELLING POINTS FOR YOU TO USE

Warms Air Completely—drawing in cold air from floor, heating it and fan-forcing it into room.

Circulates Heat—employing efficient fan-distributing principle used in modern home heating systems.

Gives Immediate Heat—for bathing, shaving and dressing, when furnace fire is low or room is chilly.

Portable—easily carried from one room to another to drive chill away. Plugs into any 110-AC wall outlet.

Safe with Children—because heating element and fan are enclosed. Won't burn rug, if upset accidentally.

Efficient and Economical—with air-intake louvers and quiet-running fan behind heating element, to drive heat off wires and out into room.

Approved by Underwriters' Laboratories and Good Housekeeping Institute

Good Housekeeping Institute

GUARANTEED AS ADVERTISED IN GOOD HOUSEKEEPING

tending power service. Chitty called the council's attention to the fact that many commercial consumers are buying power for less than the city would be compelled to pay at wholesale rates, some as low as 3½ mills per kilowatt hour.

The proposed ordinance is not likely to go through without opposition, as two councilmen have questioned the move, and quoted figures at length to prove the difficulty which might be encountered in meeting interest and principal payments on the bonds.

WWP Triumphs

Washington Water Power Co., Spokane, obtained a temporary injunction in Superior Court recently to prevent the Spokane city council from holding a special election over a franchise granted a subsidiary this spring. The utility company and eleven Spokane men joined in the petition before Superior Judge Fred H. Witt, contending the city was without authority to call the election, which would be illegal. The injunction was granted, pending a full hearing.

Thurston County Files

The Thurston County (Wash.) Public Utility District No. 1 has filed a complaint in Superior Court, seeking to condemn certain Puget Sound Power & Light Co. properties in Thurston County, and parts of Mason, Lewis and Pierce Counties. The district plans to authorize a proposed $2,250,000 bond issue, with which to acquire the properties. The suit is against Puget Sound and the Old Colony Trust Co., and was started by George F. Yantis, PUD attorney. The Thurston County PUD is the sixth in the state to seek to buy Puget Sound Power units.

Bellingham Defeats

The Bellingham (Wash.) City Council has defeated a resolution which would have authorized the city to intervene in the condemnation action of the Whatcom County Public Utility District against the Puget Sound Power & Light Co. Intervention has been proposed to protect the city's rights of home rule. Councilmen who voted against the resolution proposed that the city seek a declaratory judgment in Superior Court to determine its status under the PUD plan.

A TOTAL of $39,495 to be used in improvements at the Skagit Power project has been asked of the City Council by Eugene R. Hoffman, City Light superintendent. Improvements to residences and building at the Diablo and George camps will be made.

Plain Hoss Sense
+ good basic quality
+ up-to-date design
= SUPERIOR
REG. U. S. PAT. OFF.
★ ★ PRODUCTS
THE SUPERIOR SWITCHBOARD & DEVICES CO.
CANTON, OHIO
★ Manufacturing ★
METER & RELAY TEST SWITCHES
METER & TRANSFORMER ENCLOSURES
METER TEST BLOCKS & TABLES

SOLVE NEW VOLTAGE PROBLEMS

Installed in the Los Angeles Union Passenger Terminal are seven Gardner transformers. One 150 KVA and three 75 KVA transformers of the 4800 volt class are shown above.

---with a Custom-Built Transformer

Where individual, specialized service is demanded, as in the case of the new Union Passenger Terminal at Los Angeles, GARDNER TRANSFORMERS provide tailor-made performance. Built to order, guaranteed to meet the most exacting requirements, Gardner transformers give continuous service with a minimum of power loss.

Call your nearest representative today. Your problem is our opportunity.

REPRESENTATIVES

Geo. E. Honn Co., 420 Market St., San Francisco, Calif.; Beeson Engineering Co., 333 W. Washington Blvd., Los Angeles, Calif.; Industrial Electric Co., 1276 Denny Way, Seattle, Wash.; Kranefeld Engineering Co., 3416 14th Ave., Denver, Colo.; Ray Smythe, 501 Park Bldg., Portland, Ore.

GARDNER
ELECTRIC MANUFACTURING COMPANY
4227 Hollis St., Emeryville, California

Seattle City Light Betters Puget Sound Rate Reduction

With approval by the utilities committee of the city council of proposed reductions in Seattle City Light rates, recommended by Superintendent of City Light, Eugene R. Hoffman, the first step has been taken to meet the reduced rates proposed by the Puget Sound Power & Light Co. Like the latter's reductions, the city cut will become effective September 1, and will constitute a saving of $210,000 a year to City Light customers. Reduction per average monthly bill will be about 10%.

As drafted by Hoffman, the ordinance reduces to 4½c the present domestic rate of 5c per kw.-hr. for the first 40 kw.-hr. used by the patron a month—exactly the reduction which Puget Sound announced. For the second block of current, the existing ordinance fixes a charge of 2c per kw.-hr. for the next 200 kw.-hr. per month over the 40 kw.-hr. of the first block. The new ordinance makes the 2c rate applicable to the next 180 kw.-hr. above the forty. Puget Sound's new schedule had originally retained the 200 kw.-hr. minimum for the 2c per kw.-hr. rate.

Also changed is the minimum under which the three-fourths cent per kw. rate is fixed. The present schedule fixes the minimum at 240 kw.-hr., but the new schedule drops this to 220.

No reduction is granted by either system in the present rate of 1½c per kw.-hr. for all commercial current used in excess of 100 kw.-hr. per month per kw.-hr. of maximum demand.

Washington Water Power Declares Rate Reduction

Rate reductions amounting to $250,000 were made by the Washington Water Power Co. in schedules filed simultaneously at Olympia and Boise, Idaho, last month. The reductions are for residential and farm customers, commercial and street lighting.

A breakdown of the new rates shows that residential and farm customers will save $111,000, commercial customers $44,000 and a saving of $45,000 in street lighting and other uses.

In discussing the lowered rates, President Kinsey M. Robinson and general WWP manager said:

"Of importance to future development of electric service are the new single meter residential rates, which include approved water heating for normal use at 7-10 of a cent per kw.-hr. These rates combine in a simple way all classes of household electric service and bring the cost of electric service to Washington Water Power customers to a point among the lowest in the U. S."

"The Spokane rate schedule had in the past given 13 kw.-hr. for 70c. Under the new rate there the customer now receives 14 kw.-hr. for 70c and the rate per kw.-hr. for the next block reaches the low figure of four cents per kw.-hr. Corresponding reductions have been made in the residential rate for other localities. After the minimum for strictly residential service has been reached, there is no rate in excess of five cents at any point in the company's system."

Robinson also stated that the Washington Water Power Co. after 50 years of continuous service has the low average residential rate of 2.22 cents per kw.-hr., half the national average. As a result of repeated lower rates, the Inland Empire has the highest acceptance of electric service in the home of any locality in the nation, the average residential use per customer for the 12 months ended April 1, 1939, being 2011 kw.-hr.

Linn County Voters Defeat PUD Formation Plan

The formation of another Oregon public utility district was sidetracked July 11, when the Linn County voters defeated a proposal to form a PUD by a vote of 2,356 to 2,054. This is the 3d time the county has turned down a similar proposal.

In this special election, the city of Albany, which had returned heavy noe votes in the two previous elections, was excluded from the district, headquarters of which was to have been at Lebanon. Lebanon, however, voted strongly against the measure, as did every other municipality in the proposed district except Harrisberg, which voted favorably by a margin of 16 votes. The vote in the rural areas outside the municipalities favored the district by a vote of 1,544 to 1,455.

SEATTLE CITY LIGHT linemen are entitled to time and a half pay for working overtime on Sundays and holidays, the State Supreme Court ruled recently at Olympia, in a case brought by Charles A. Harzell, et al, against the city. The city contended they were not entitled to the overtime pay unless they worked the full five days during the week, and that their suit was not good, because they had accepted their regular pay for years with protest. The court declared the work outlined was of urgent nature for the most part, and they were entitled to the extra money.

State Court Rules Against Olympia REA Regulation

The state public service department at Olympia is without power to regulate rates and operations of rural electrification projects because they are not public utilities, the State Supreme Court ruled recently. The ruling upheld a declaratory judgment from Thurston County superior court, which held the Inland Empire Rural Electrification, Inc., was not subject to the department's supervision. The company was organized in March, 1937, by Spokane and Whitman County farmers and was financed by a $1,000,000 loan from the FREA. The project buys its power wholesale from the Washington Water Power Company and delivers it over its transmission lines to member farmers. The public service department for some time exercised jurisdiction over it, requiring it to submit notes and mortgages for approval, pay a supervisory fee and file its rates and schedules for approval.

The Supreme Court ruling pointed out that the project was not a public service corporation because "it did not dedicate or devote its facilities to public use, nor has it held itself out as serving, or ready to serve, the general public. It functions entirely on a co-operative basis—it is a league of individuals associated together in corporate form for the sole purpose of producing, and procuring for themselves a needed service at cost."

City of Provo Begins New Power Plant Construction

With $850,000 to its credit in a Chicago bank, the city of Provo, Utah, is going ahead with construction of a municipal power plant, according to Mayor Mark Anderson. Members of the Ulen Contracting Corp., Chicago, have been conferring with Provo city officials and it is expected that a job engineer will open a central office in Provo shortly.

The Provo plant is to be similar to the one at Fort Collins, Colo., but will have a greater kilowatt capacity. It will consist of two units of 2,000 kilowatt capacity each.

Two bond ordinances passed by the city commission provide that when the city of Provo acquires its own electric plant and system, no competing system will be permitted within the boundaries of the city. The second provides for the issuance and sale of the electric revenue bonds to the John Nuveen & Co., Chicago bond brokers.

Tenseness as they wait for that first crashing lightning bolt, relief and awe after it has struck —that's the tribute lightning exacts from its audience in Steinmetz Hall at the New York World's Fair

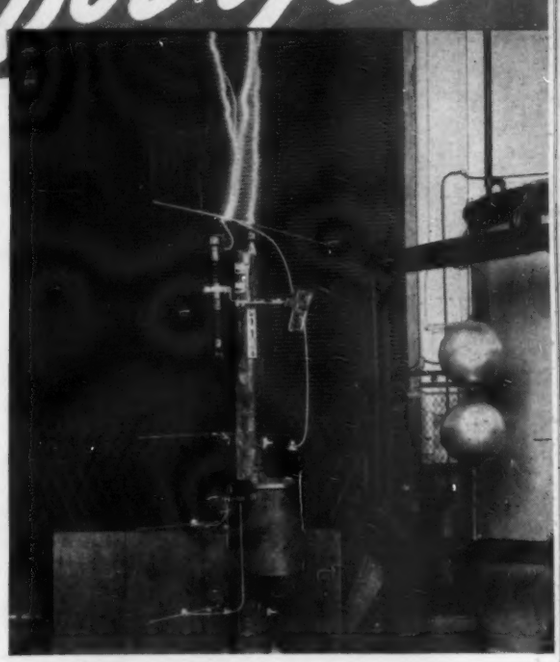
THRILLS FOR THEM *Protection for You*

GENERAL ELECTRIC engineers have been studying lightning at close range for many years. Building on a rich heritage—the studies of high-voltage phenomena by the late Charles P. Steinmetz—G-E engineers have continually supplemented field studies with extensive laboratory tests.

With the findings from this extensive research, they are able to design transformers and protective equipment that are fully co-ordinated for lightning conditions encountered in service.

For example, they have learned how to construct distribution transformers with insulation properly distributed to meet the stresses impressed on it by transient overvoltage conditions. They have also extended the discharge capabilities and the known performance characteristics of pellet arresters, which limit the lightning voltage that can reach transformers to values far below the strength of the transformer's insulation.

Many operating engineers, bent on obtaining the best possible operating performance, are relying on the General Electric tested recommendations for the protection of distribution transformers. It will pay you to consult your G-E representative for the facts on this subject. He has proved information. General Electric, Schenectady, N. Y.



In General Electric's high-voltage laboratory at Pittsfield, Mass., facts about lightning are being accumulated to help engineers find how to protect your equipment. Here, for example, a test demonstrates the protection afforded by a pellet arrester to a rural-line transformer

GENERAL ELECTRIC

300-77

FOR ANY End to End CONNECTION

Approved by the Underwriters

Save 50% with BLACKBURN "GRIPITS"

Costing only half as much as split bolt connectors, Gripits are more economical for range installations, service entrance connections, and for use wherever wires are connected end to end. Gripits are made completely of Duronze, a silicon bronze actually stronger than steel, and will not stretch or distort when tightened

JASPER BLACKBURN PRODUCTS CORP.

Main and Clinton Sts. St. Louis, Mo.

For Convenience BANK BY MAIL

Our Bank-by-Mail Service extends the facilities of this old, metropolitan Bank to every point where mail is delivered. Both checking and savings accounts may be conducted with utmost safety and convenience.

Write today...

for free Bank-by-Mail kit containing all necessary forms, return envelope and simple instructions.

CROCKER FIRST NATIONAL BANK OF SAN FRANCISCO

California's Oldest National Bank

Member Federal Deposit Insurance Corporation

Nebraskan Low Bidder On Parker Dam Power Lines

Dwight Chapin, Jr., Lincoln, Neb., was low bidder on construction of power lines from Parker Dam to Phoenix and Parker Dam to Blaisdell, when bids were opened by the Bureau of Reclamation last month. Chapin's bid for the Phoenix line, which will be 140 mi. long, and which must be completed within 90 days of start of work, was $124,194, if copper wire is used, and $129,794 if aluminum wire is used.

For the Blaisdell line, to be 120 mi., and for which a 240-day construction period is allowed, his offer was $85,500 for copper wire, and $90,600 for aluminum cable construction. The Phoenix line, which is expected to be in service by early fall, will bring Hoover Dam power into the Salt River valley from the Metropolitan Water District of Southern California's line to its booster pumps at Parker Dam. Ultimately it will carry power generated at Parker Dam.

All material for the two lines is being purchased through the Denver regional office of the reclamation bureau. Bids on some of this material, such as poles, have already been opened, and others will be called as necessary to tie in with the construction work, E. C. Koppen, resident engineer of the reclamation service, stated.

San Francisco Officials Ask Congress to Amend Raker Act

San Francisco city and county supervisors last month voted to ask Congress to amend the Raker Act, which grants San Francisco its Hetch Hetchy water rights, specifying the means of distributing the by-product power.

Present distribution of Hetch Hetchy energy through P. G. and E. facilities has been ruled in violation of the act, and an appeal is before a federal court. Revision of the act to remove restrictions against sale of the energy to a private system would render the present litigation meaningless.

Under the agency agreement with P. G. and E., San Francisco collects more than $2,000,000 a year.

THE LOS ANGELES BOARD of Water and Power Commissioners on July 20 awarded to the Ford J. Twaits Co., lowest bidder meeting with complete specifications, a contract for construction of a new underground headquarters for the Bureau of Power & Light to cost $399,781. The project, to consist of four buildings, will be located at First and Boylston Sts.

Keep the KITCHEN Out of the LIVINGROOM!

Vent-A-Hood kitchen ventilator equipped with a GREASE TRAP to keep ceiling and walls clean—a patented centrifugal exhaust unit that forces cooking odors, steams and vapors out before they have a chance to invade the rest of the house . . . . Investigate this modern kitchen ventilator before you build or complete your plans. It's new, modern efficient. Exhaust unit may be had separately or with the hood. Ask for illustrated folder.

The VENTAHOOD Co.

2808 COMMERCE STREET

DALLAS, Dept. E TEXAS

The added feature that SELLS RANGES

CHROMALOX Super-Speed RANGE UNITS

These units on the range you sell, give you a sales story with a wallop! Use them for replacement, too—they fit all ranges.

REPRESENTED by

MONTGOMERY BROTHERS

911 Western Ave., Seattle, Wash.

1501 N. W. Kearny St., Portland, Ore.

61 Fremont St., San Francisco, Calif.

420 S. San Pedro St., Los Angeles, Calif.

THE PETERSON COMPANY

1921 Blake St., Denver, Colo.

EDWIN L. WIEGAND CO.

7540 Thomas Blvd., Pittsburgh, Pa.

B.C. Public Utilities Commission Begins Property Appraisals

First steps in the direction of appraisal of properties of British Columbia public utility companies was taken by Dr. W. A. Carrothers, chairman of the B. C. Public Utilities Commission.

S. R. Weston, former chief engineer of the New Brunswick Power Commission, and new chief engineer of the British Columbia Commission, commenced appraisal of properties of the B. C. Electric Railway Company in Vancouver and the lower Fraser Valley area on August 1.

"This is the beginning of a complete appraisal of all public utilities in the province," Dr. Carrothers said, "The whole work will take three or four years. No action in the direction of adjustment of rates is anticipated for a year or eighteen months, however," he added.

Gamble-Scogno in Colorado Ordered to Pay Chain Tax

Gamble-Scogno, licensing some 30 "Gamble" stores in Colorado, must pay the graduated chain tax upon them, and James W. Creamer, head of the Store Tax division, announced he will proceed to levy taxes on other chains employing the same system. The tax starts with a nominal sum on a single store, reaches $300 applied to all stores in the highest bracket. Contention of the company, which was upheld in the Denver District Court, is that the stores are independently owned and controlled, and so not subject to the tax. The Supreme Court reversed this decision, declaring that the stores are, in effect, chain controlled. The suit was to recover the chain tax on 19 stores in 1935, 31 in 1936, and 30 in 1937. The Gamble stores deal in automotive, hardware, and electrical merchandise.

In its written opinion, unanimously expressed by seven justices, the Court drew a clear distinction between "agency" stores and groups of independent merchants formed for cooperative buying. The latter are not subject to the chain tax.

RECENT APPOINTMENTS by Joseph K. Carson, mayor of Portland, to the Electrical Code Board of Appeal are the following: F. H. Murphy, Portland General Electric Co.; V. H. Haybarker, electrician for KGW and KEX and A. A. Tobey of the Jagger-Sroufe contracting firm. Alternates appointed were L. R. Elder, General Electric Co.; J. H. Lake, Local Wireman Union, and R. C. Kenney, electrical contractor. All terms run to August, 1941.

RUBBER COVERED POWER CABLE • BUILDING WIRE

CRESCENT
INSULATED WIRE and CABLE

Railroads Use It!

To give added safety to their greatest slogan, SAFETY FIRST, many of the country's great railroads give CRESCENT Wire and Cable the "right of way."

In our multi-conductor Railway Signal Cables, you'll find every feature of toughness and durability that makes for long life under severest duty —exposed to all weather or buried underground.

CRESCENT
INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY

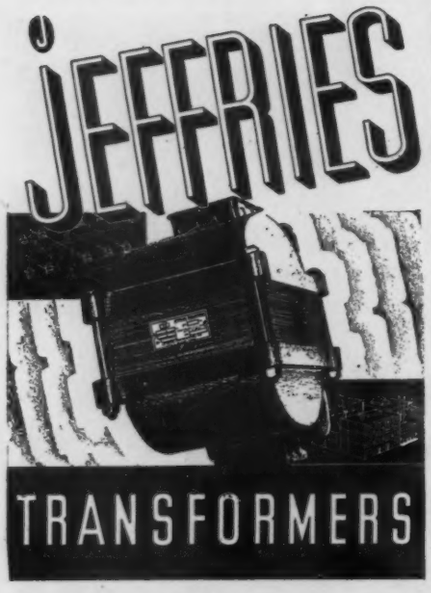
WESTERN REPRESENTATIVES

LOS ANGELES	SAN FRANCISCO	KANSAS CITY
Henger-Seltzer Co.	Hodges & Glomb	W. F. Howe & Co.
130 S. Hewitt St.	1264 Folsom St.	2627 McGee St.

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESCENT ENDURITE SUPER - AGING INSULATION



Save Their Cost and Pay Dividends by—

1. Elimination of duplicate conduit runs.
2. Saving in power rate.

(Put all of your 110-volt equipment on a 220-volt or 440-volt power circuit, it is economical.)

JEFFRIES TRANSFORMER COMPANY
5706 Long Beach Ave. Los Angeles

We take pleasure in

ANNOUNCING

the appointment of

Condon & Young, Inc.
357 So. Hill St.
Los Angeles Calif.

As Representatives for Southern California

and of

Geo. E. Honn Co.
420 Market St.
San Francisco Calif.

As Representatives for Central California

—of—

Bierce "Sure Grip" Guy Wire Protectors
Bierce Tubular "Sure Grip" Guy Guards
Bierce Cone Anchors
Bierce Plate Anchors
"Standard" Telescopic Earth Augers

The Specialty Device Co.
106 West 3rd St. Cincinnati, Ohio

WWP To Spend $1,500,000 On Distributing Systems

K. M. Robinson, Washington Water Power Co. president, said $1,500,000 of new money from a recent $22,000,000 refunding loan will be used to "extend and increase the capacity of our distributing systems."

"The bond issue enabled the company to meet $4,400,000 in bonds due in 1939 and refund $15,500,000 of bonds due in 1960," he said. "It leaves in cash, after all expenses, about $1,500,000."

Robinson stated he believed the bond issue was received favorably because of the "company's offer of cooperation with the Federal government to assist in marketing the tremendous blocks of power to be produced at Grand Coulee and Bonneville."

"Our company hopes that a plan of cooperation will be worked out with the federal government so that our future power requirements can be purchased from these governmental plants," he concluded.

Federal Survey Covers Western Utilities

Of the aggregate $13,851,583,019 in utility plant accounts of privately-owned U. S. power companies, $2,026,837,390 or 14.6% is in the 11 Western states, according to a survey just released by the Federal Power Commission. Far Western power companies account for 11.5% of the total revenue of $2,532,444,360 for the same group of companies.

These figures are revealed in a two-volume report just issued by the FPC covering financial information on 365 companies which represent 90% of the electric utility industry of the U. S. Readily available for the first time are uniform and detailed statements of revenues, operating expenses, classification of utility plants and related data on physical characteristics for each of the major electric utility companies of the country. Companies are arranged alphabetically by states. The books may be obtained from the FPC at $2 per set.

Albuquerque Contractors Sue Local Union

Albuquerque Electrical Contractors Assn. last month filed suit for $6,000 damages against local union No. 611, International Brotherhood of Electrical Workers, charging electricians with a breach of contract in their strike in Albuquerque July 1. The union men were reported asking for an increase in wage from $10 a day to $11.

Individual members of the contractors' association alleged in the suit their "loss of profits and loss of business" due to breach of contract, are as follows: Lee A. Miller Electric Co.; William R. McCracy, Union Electric Co.; H. A. McCarthy; George Dawson, Huning-Testman Electric Co. and E. F. Bridgeman Electric Co.

Seavy Unanimously Named Federal Power Chairman

Clyde L. Seavy, former chairman of the California Railroad Commission, last month was unanimously named chairman of the Federal Power Commission, for a term expiring June, 1940. Claude L. Draper of Wyoming was appointed vice-chairman.

This was the first FPC gathering since 1937 when Chairman Frank P. McNinch resigned to become head of the Federal Communications Commission. Seavy has been acting chairman since McNinch resigned.

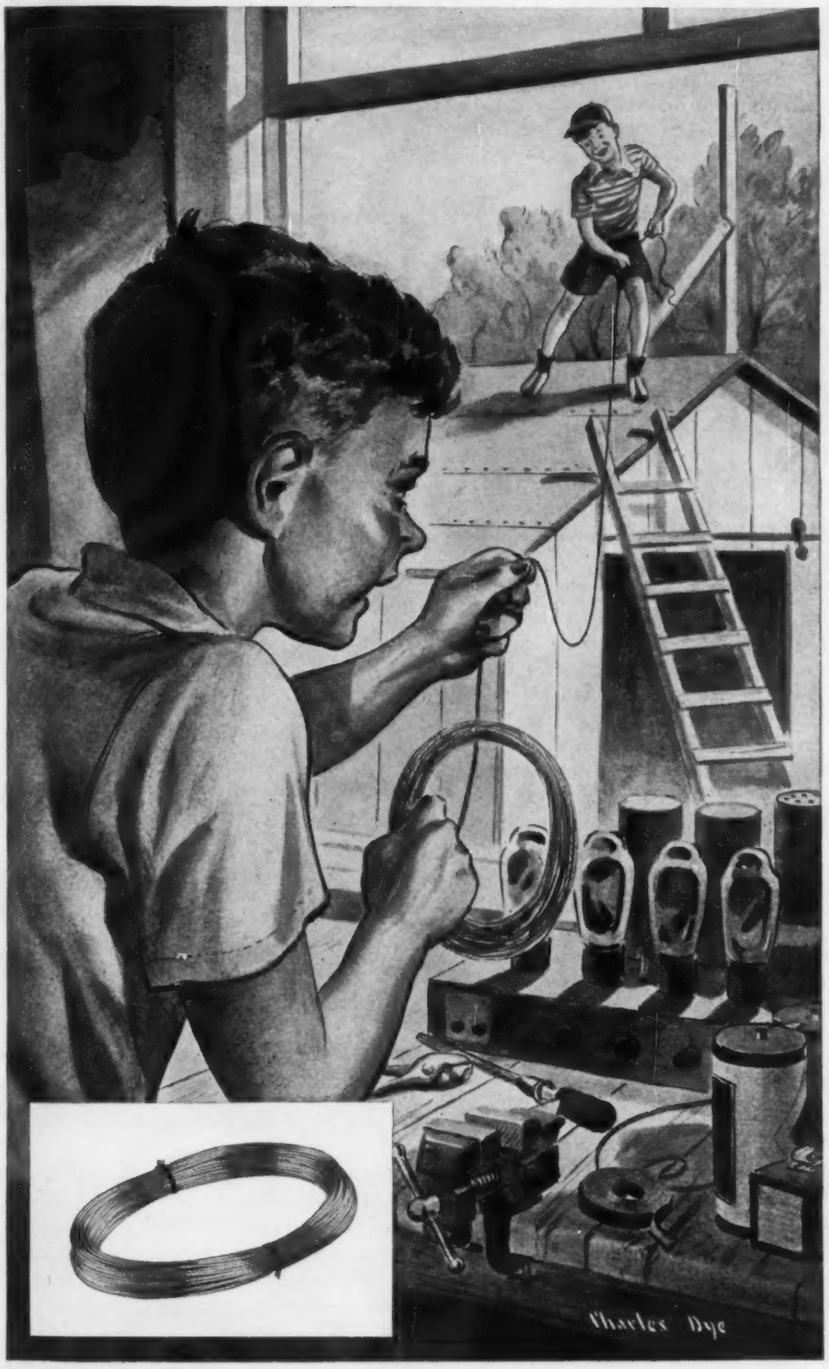
City of San Francisco Cuts P. G. & E. Power Franchise

San Francisco's supervisors' finance and utilities committees last month cut $19,000 from the $500,000 they had previously asked of the P. G. and E. for a power franchise. This is still $181,000 above the price of $300,000 offered by the company, plus annual payment.

The new demand amounts to estimated annual tax payments under the proposed franchise grant for the past three years. Under the agreement being negotiated, the annual tax would be ½% of gross receipts from electricity sales in San Francisco.

FINAL TESTS having been successfully passed, the Hayfield pumping plant of the Metropolitan Water District of Southern California, 40 miles east of Indio, will go into operation this fall to lift water 441 ft. over the last mountain barrier on the Colorado river aqueduct route, according to F. E. Weymouth, general manager and chief engineer of the water district. The 12,500 h.p. electric motors and pumps at the Hayfield plant are the largest of their kind ever built. This is the last of the five huge pumping plants on the aqueduct to be prepared for operation in the autumn to bring water to the 13 Southern California cities comprising the aqueduct district. James H. Gaylord is chief electrical engineer of the Metropolitan Water District.

From Antenna Wire to



BUILDING WIRE

OVER 60 TYPES OF

ROEBLING ELECTRICAL

WIRES AND CABLES

Rubber Covered Wires and Cables: Code; Performance; and Heat Resisting; Plain Rubber 60% sheath Power Cable and 40% and 60% sheath Flexible Cords

Power Cables: Paper; Cambric; Rubber

Parkway Cable,
metallic and non-metallic

Service Entrance Cable

Slow-Burning Wires and Cable

Weatherproof Wires and Cable

Police-Fire Alarm Cable

Appliance Cords

Annunciator and Blasting Wire

Network Cables

Magnet Wire

Welding Cables

And a wide variety of other wires and cables; either Standard or to Customer's Specifications

QUICK SHIPMENT

Prompt Service is available at all offices and warehouse points listed below, where large stocks of a wide variety of standard Roebling Wires and Cables are always on hand. Your request for information, prices or samples will be welcomed.

JOHN A. ROEBLING'S SONS CO. OF CALIF.
San Francisco, Los Angeles, Seattle, Portland

IF IT'S ELECTRICAL WIRE OR CABLE **ROEBLING** HAS IT!

Bonneville Administration Active on Many Fronts

Secretary of Interior Harold Ickes last month appointed Herbert S. Marks, Chattanooga, Tenn., as general counsel of the Bonneville project, and C. Allen Hart, Jr., Portland, as assistant general counsel. Marks and Hart were named on the recommendation of acting general counsel James Fly. Both men assumed their new duties Aug. 1.

Marks has been on the TVA legal staff since 1934, and for the last two years served as assistant general counsel. A graduate of the University of Pennsylvania and Harvard Law School, he has taken a responsible part in the preparation of trials and appeals of the constitutional litigation brought by the power companies and various related interests to enjoin the power activities of the Authority.

The new assistant general counsel Hart is a graduate of Stanford University and Yale Law School. He is a member of the Oregon bar and of the bar of the Federal District Court of Oregon of the 9th Circuit Court of Appeals and of the U. S. Supreme Court, and since 1938, has been special assistant to the U. S. District Attorney in charge of anti-trust prosecution.

On July 25, Banks named Horace E. Bixby principal electrical engineer for the Bonneville project. Bixby, a well-known electrical engineer of the Pacific Northwest, will have charge of power sales and supervision of contracts, a position much like that held by R. W. Beck, discharged by Secretary Ickes shortly after the death of J. D. Ross.

Bixby has been power superintendent on the Flathead Irrigation project of the Department of Interior in Montana since 1931. Prior to that for 10 years he was a power engineer with Portland General Electric Co. Before coming to Portland he was electrician for the Santa Fe Railway, taught electrical engineering in the University of Pennsylvania, was with the U. S. Reclamation Service, and operated an engineering and contracting business in Idaho.

Change in Construction Program

First major change in the transmission construction program for Bonneville from that proposed by former administrator, J. D. Ross, was announced late in July by Frank A. Banks, Acting Administrator. The second 220 kv. line from Bonneville to Grand Coulee, originally proposed to parallel the first, will be abandoned and the appropriation for it will be diverted to construct a 220 kv. line from Chehalis, Wash., north near Tacoma and Seattle, and thence eastward across the Cascade Mountains to Grand Coulee. A 220-kv. line is already projected from Bonneville through Vancouver, Wash., to Chehalis. It is pointed out that this new plan will tap additional load centers in western and central Washington and furnish a loop transmission system between Bonneville and Grand Coulee.

A sum of $3,000,000 of the presently appropriated $13,000,000 for transmission construction in fiscal 1940, is to be diverted to start construction on this line north of Chehalis. This is expected to carry the line somewhere near Seattle.

Banks also declared that funds from his transmission appropriation will be made available for feeder lines from main substations to prospective loads as fast as those loads develop.

New Wholesale Rates Expected

New alternative wholesale rates for Bonneville power are expected to be approved by the Federal Power Commission shortly, according to Administrator Frank A. Banks who returned to Portland early in July after a conference with the Commission on rates and contracts in Washington, D. C.

The new rates will contain a demand plus energy charge to meet the needs of low load factor customers who cannot use the previously published kw.-yr. schedule profitably. Another new schedule governs the sale of dump or surplus power to customers who will contract for prime and secondary power and who have their own generating facilities with which to pick up this dump load when it is not available.

These new schedules are expected to meet operating conditions of such prospective customers as the city of Eugene, Portland General Electric Co., and others who have sought contracts with Bonneville on a basis under which there would be some real saving that could be passed on to customers.

Banks was optimistic that the new rate would open the way to the sale of Bonneville's present 86,000 kw. capacity within six months.

THE FEDERAL POWER COMMISSION has granted authorization to the San Diego Consolidated Gas & Electric Co. to export electric energy to Mexico to supply the Border Telephone & Light Co. and the town of Tecate. The authorization expires in 1942. The new order grants permission to install heavier equipment in order to increase the annual sales from approximately 700,000 kw.-hr. to approximately 3,400,000 kw.-hr. at 550 kw. and 100,000 kw.-hr. at 40 kw. peak load.

Cascade Locks First Customer of Bonneville Project

The municipality of Cascade Locks has tied into Bonneville lines, following its formal acquisition of the West Coast Power Co. properties late last month. This makes the city the first permanent customer of the Bonneville project.

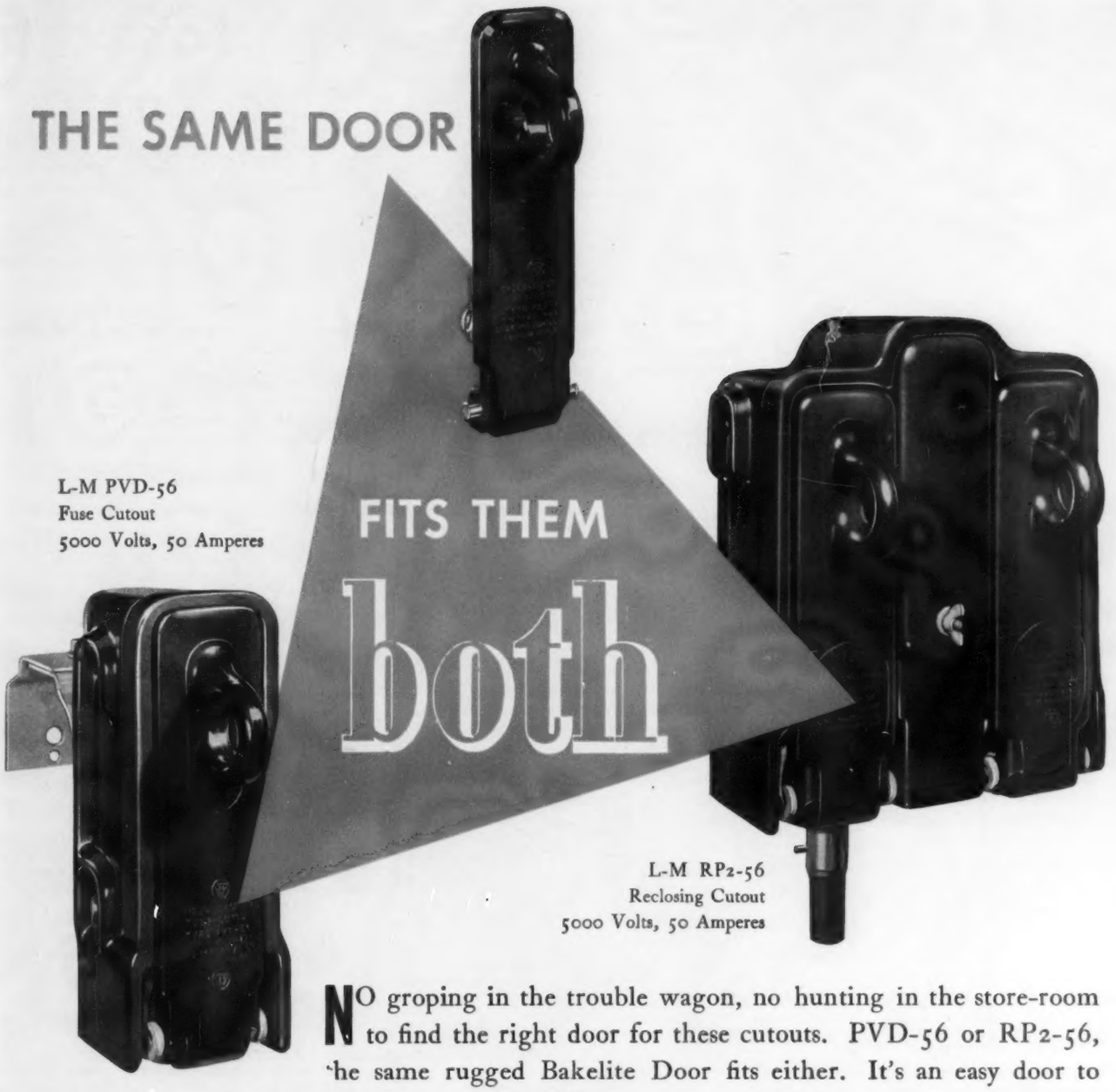
Cascade Locks paid about $44,000 to West Coast for their properties, including a small hydro plant. This plant will not be used, according to Bonneville authorities. Funds for the purchase were derived from the sale of a $79,000 revenue bond issue.

APPROVED BY EUGENE R. HOFFMAN, new Seattle City Light superintendent succeeding J. D. Ross, two ordinances vitally affecting operations of the municipal utility have been passed by the city council. One ordinance extends the duties of Isaac Comeaux, chief accountant in City Comptroller, W. C. Thomas' office to include, under the Comptroller's direction, general supervision of the lighting department's budget, accounts and financial affairs. The ordinance increases the salary of the position to $500 per month, of which $200 will be paid by City Light. The other ordinance transfers from the department's statistician to its sales manager, the advertising business of the lighting department.

SOUTHERN CALIFORNIA EDISON CO. has filed an application with the Federal Power Commission requesting a determination of the equitable proportion of annual charges due to the applicant from the San Joaquin Light & Power Co. for interest, maintenance, and depreciation on its storage reservoir and other headwater improvements. This was so requested because of benefits received by the Kerckhoff plant of the San Joaquin Co., located on the San Joaquin River during 1937-38, under Section 10 of the Federal Power Act.

PRESENTING—the Allergy Electric Mask for Hay Fever Sufferers! The Crescent department store in Spokane recently ran a newspaper advertisement featuring this unique device, which uses a small replaceable battery lasting one year. "No plugging into an electric socket. Is absolutely shock-proof. Permits conversation and the wearing of glasses," says the ad. The mask was invented by a Cincinnati physician specializing in allergy. By combining mechanical and electrical means of filtration, 99 to 100% of all pollens and molds is prevented from reaching the sensitive membranes of the nose.

THE SAME DOOR



L-M PVD-56
Fuse Cutout
5000 Volts, 50 Amperes

FITS THEM

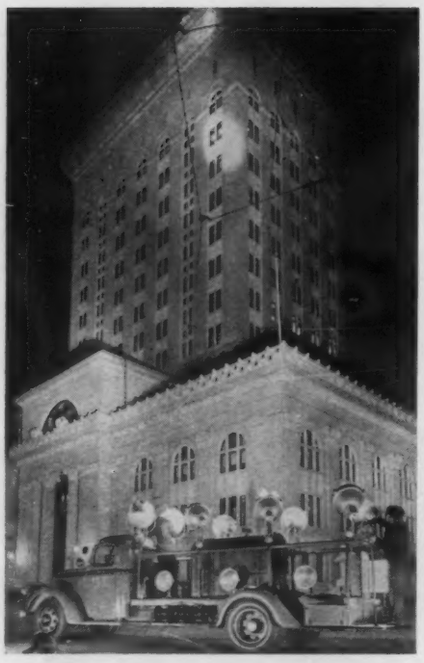
both

L-M RP2-56
Reclosing Cutout
5000 Volts, 50 Amperes

NO groping in the trouble wagon, no hunting in the store-room to find the right door for these cutouts. PVD-56 or RP2-56, the same rugged Bakelite Door fits either. It's an easy door to handle, too . . . you jerk it open and lift it off, or snap it on the hinge and slam it shut in one swift sweep. No hunting, easy handling . . . you lop minutes off the time it takes to restore any outage.

Interchangeable doors is just one of the features these two great L-M Cutouts give you. Both have the original L-M Indicating Dropout feature . . . when the fuse link blows, the cartridge drops down to clear indicating position, yet the door stays closed. The dropped down tube gets your eye as soon as you see the cutout . . . spots trouble instantly . . . the closed door continues to shield working parts from rain, sleet and foreign matter. Line Material Co., Main Offices: South Milwaukee, Wisconsin.

LINE MATERIAL CO.



Oakland Fire Department Uses Modern Floodlighting

Two 1,000,000 candle-power searchlights top the equipment mounted on the emergency-work floodlighting truck of the Oakland fire department. The truck unit, which was built in the fire department shop, consists of the searchlights, six mounted floodlights and six portable floodlights, each supplied with 200 ft. of reeled cable, a no-fuse control switchboard, and a fully automatic engine-generator set, mounted on a high speed truck.

This all Westinghouse equipped truck is used for varied services, including standby service for operating fire alarm systems in event of disaster to local power supplies, providing light for clearing earth slides on unlighted highways, lighting the area around bad railroad or auto accidents, and illuminating buildings or areas requiring concentrated police protection. Other uses visualized would be to aid in building fire walls against forest fires, and in rescue work along the city's beaches.

Expert Says Lake Mead Causes Increase in Earthquakes

Admiral L. O. Colbert, director of the Coast and Geodetic Survey, recently disclosed during House hearings on appropriations for the Commerce Department that Hoover Dam and the waters of the Colorado River, which have backed up in it to form Lake Mead, have caused a sharp increase in earthquakes in that area.

Admiral Colbert said that there were no records of any earthquakes in the ten years prior to the filling of the lake. A total of 65 quakes were felt in 1936-37 and 505 in 1938, of which 55 were strong enough to be felt by persons living near the lake.

KINSEY ROBINSON, president of Washington Water Power Co., announced company plans to construct 400 mi. of power line this summer to serve rural residents of Lincoln and Adams Counties. About $400,000 will be spent in this rural service expansion. The new lines will be built at a cost of about $800 a mile.

Contracts Awarded

To AMERICAN TRANSFORMER CO., Newark, for transformers for Gering substation, Kendrick project, $32,625; item 2 to Moloney Electric Co., St. Louis, $12,000.

To NEW STATE ELECTRIC CO., Phoenix, for inter communication system; telephone conduit, fire alarm clock and buzzer system in new Junior College and North Phoenix High School, $10,497.

To PENNSYLVANIA TRANSFORMER CO., Los Angeles, for distribution station transformers for Bureau Power & Light, $171,720.

To WEYERHAEUSER POLE CO., Lewiston, Idaho, for wood poles, wood cross arms, ground-wire molding for transmission lines for Parker Dam project, $47,062; schedule 2 to MacDonald & Harringoon, Ltd., San Francisco, $17,083; schedule 3 to Cascade Pole Co., Tacoma, $43,791.

To SIMPLEX VALVE & METER CO., Philadelphia, for flowmeters for Elephant Butte Power Plant, Rio Grande project, $2,861.

To O. A. CARLSON, Seattle, for electrical work on new Broderick & Bascom Rope Co., Seattle.

To STONEWALL ELECTRIC CO., Trinidad, Colo. for construction of 19 mi. of line in Sheridan County, $24,000.

To HUME & RUMBLE LTD., Vancouver, for electrical work on new wing, St. Paul's Hospital, Vancouver, $349,736.

To SPENCER ELECTRIC CO., San Francisco, for light and power system on Mare Island, California, $5,000.

To V. LEMOGE, San Francisco, for electrical work on new Junior High School, Oneida Ave., San Francisco, $28,970.

To UTAH POWER & LIGHT CO., for removing 25 mi. of poles and overhead wires, new power district center and new lighting system for city of Ogden's arterial highways, $250,000.

To COLLIER ELECTRIC & RADIO CO., Denver, for construction of 99 mi. of transmission line for Inter-Mountain Rural Electrification Assn., Bailey, Colo., $86,365.

To STANDARD ELECTRIC CONSTRUCTION CO., San Francisco, for electrical work at Horace Mann Jr. High School, San Francisco, $6,888.

To C. R. INMAN, Worland, Wyo., for construction of 59 mi. of line for Flathead Light & Power Assn., Kalispell, Mont., $62,754.

To H. A. RISK PIPE & CONSTRUCTION CO., Nebraska City, Nebr. for building 175 mi. of line for Big Horn Rural Electric Co., Basin, Wyo., $118,375.

To J. KORB, Los Angeles, for electrical work on female custodial building units State of California, $25,737.

To PARAGON ELECTRIC CO., San Francisco, for electrical work in auditorium Francis Scott Key School, $3,600.

To VAN COTT CO., Los Angeles, for electrical work in sheep barn, California Polytechnic School, $5,765.

To BENNETT & TAYLOR, Los Angeles, for construction of 119 mi. of line for Inland Empire Rural Electrification Inc., Spokane, $95,474.

REA

BRIDGER VALLEY ELECTRIC ASSN., INC.—Lyman, Wyo., has been awarded $108,000, of which $78,000 will be used to build 52 mi. of line in Uinta County, and the remainder for construction of generating plant.

MID-YELLOWSTONE RURAL ELECTRIFICATION ASSN. has been allotted $133,000 to build 70 mi. of line in Rosebud and Treasure Counties.

SOUTHEAST COLORADO POWER ASSN., Lamar, Colo.— has been awarded $152,000 to build 165 mi. of line in Otero, Crowley, Pueblo, Bent and Prowers Counties.

SUN RIVER ELECTRIFICATION ASSN., Fairfield Mont., has been allotted $69,000 to build about 69 mi. of mile in Cascade and Cheuteau Counties.

BLACHLY-LANE COOPERATIVE ELECTRIC ASSN., Blachly, Ore., $12,000 to build about 10½ mi. of line in Lane County.

SULPHUR SPRINGS VALLEY ELECTRIC COOPERATIVE, Wilcox Ariz., has been awarded $120,000 for construction of a generating plant. The project had previously been allotted $368,000 to build 269 mi. of line in Cochise and Graham Counties.

MOUNTAIN EMPIRE ELECTRIC COOPERATIVE, INC., Gampo, Calif. has been awarded $2,000 to finance house-wiring in their area. A sum of $79,000 had previously been allotted to build 64 mi. of line in San Diego County.

KOOTENAI RURAL ELECTRIFICATION ASSN., Inc. has been awarded $5,000 for house-wiring.

FALL RIVER RURAL ELECTRIC COOP., Ashton, Idaho, has been awarded $10,000 for house-wiring. The project had previously been allotted $80,000 to build 62 mi. of line in Fremont County, and $3,000 for wiring.

PUBLIC DISTRICT NO. 1 OF WASHINGTON, Ellensburg, Wash., has been allotted $5,000 for house-wiring. The project had previously been awarded $151,000 to build 127 mi. of line in Kittitas County.

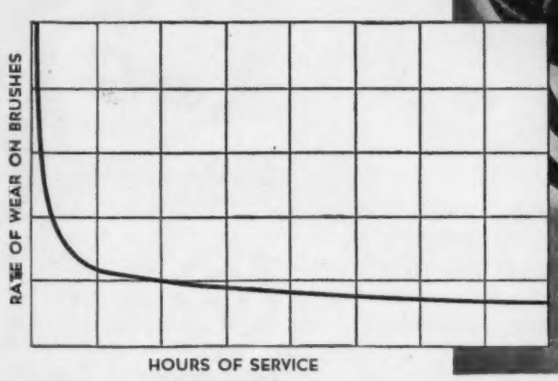
RURAL ELECTRIC CO., Pine Bluffs, Wyo. has received $8,000 for house-wiring.

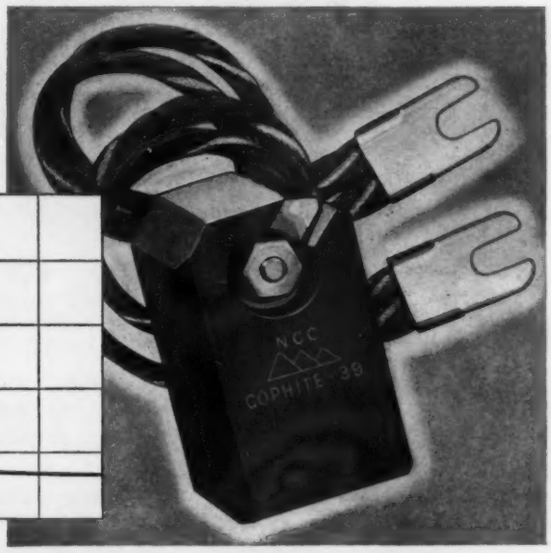
The Slip Ring Brush YOU'VE BEEN LOOKING FOR

- EXCELLENT RECORDS OF BRUSH LIFE
- FREEDOM FROM SELECTIVE ACTION
- ABSENCE OF DUSTING AND THREADING
- UNUSUAL STABILITY OF PERFORMANCE

Cophite-39

The stability of performance and the steady improvement in condition and friction of the slip ring surface on machines equipped with Cophite 39 brushes are indicated by the decreasing rate of brush wear commonly observed as the period of service increases. The curve shown below is characteristic of brush wear data recorded on many Cophite 39 applications.





Cophite 39 Slip Ring Brushes give dependable performance over a wide range of load conditions.

•

They are adapted to either railway or lighting service on synchronous converters of ANY make.

•

They develop and maintain a uniform surface film of low friction on the ring surface.

•

They are recommended for current densities up to 125 amperes per square inch.

THERE IS A **NATIONAL** TRADE-MARK CARBON, GRAPHITE OR METAL-GRAPHITE BRUSH FOR EVERY TYPE OF EQUIPMENT

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC and Carbon Corporation
Carbon Sales Division, Cleveland, Ohio
GENERAL OFFICES
30 East 42nd Street, New York, N. Y.
BRANCH SALES OFFICES
New York Pittsburgh Chicago San Francisco

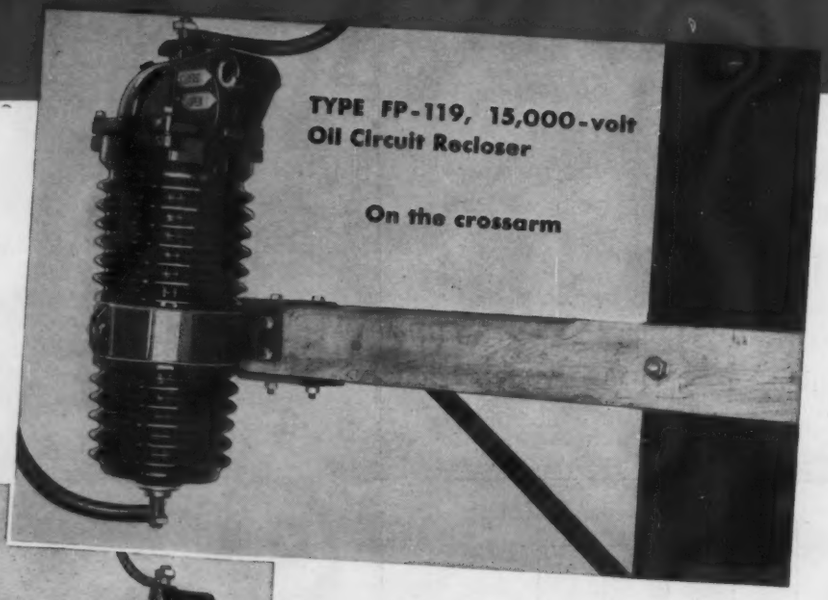
USE THIS COUPON *if you desire our representative to call and quote on Cophite 39 brushes for your converter equipment or recommend a suitable grade of "NATIONAL" brushes for some other class of service.*

*Name*_____ *Position*_____ *Company*_____

*Address*_____ *City*_____ *State*_____ EW

It's AMAZING

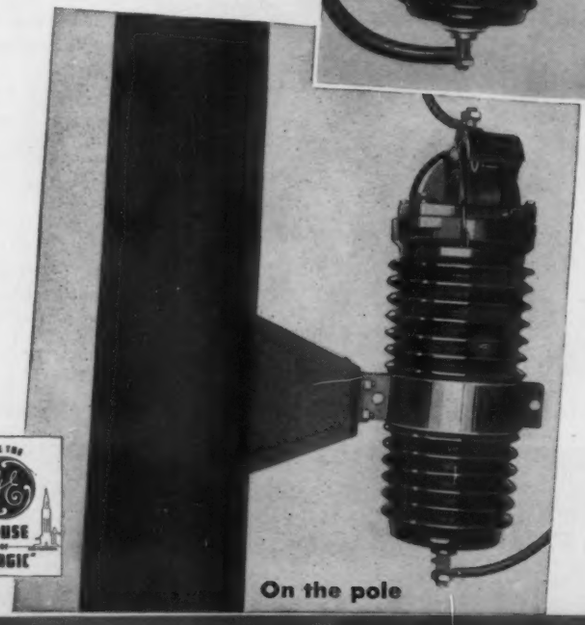
—the amount of trouble *and money* this little device* can save you!



TYPE FP-119, 15,000-volt Oil Circuit Recloser

On the crossarm

*THIS 15,000-volt automatic recloser brings to low-revenue lines protection previously obtainable only with large automatic reclosing circuit breakers.



On the pole

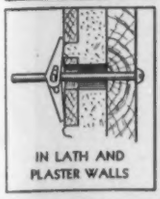
THIS G-E recloser saves your maintenance crew a lot of trips by resetting automatically and restoring service, if the fault is transient—and most of them are. If the fault persists, it recloses three times at 3-second intervals and then, if the fault is still there, it opens and locks open—to be hand reset.

Ideal for low-cost protection on suburban and rural lines. Five ratings: 3, 6, 12, 25, and 50 amperes. Ratings easily changed in the field.

Learn more about its six money-saving features —in Bulletin GEA-2846, sent on request. General Electric Company, Schenectady, N. Y.

SEE THE GE HOUSE OF MAGIC

GENERAL ELECTRIC



PAINE

SPRING WING TOGGLE BOLTS

These are better toggle bolts in every detail. Press through the smallest hole. Open in the minimum space. Each jaw operates independently the instant it has clearance, never catch or jam in rough or irregular surfaces while being inserted. Self-bracing, they lock thread when fully tightened preventing screw (or bolt) from loosening. Insist on PAINE Toggle Bolts for firm anchorage in every type hollow wall. 18 types, each in 60 sizes.

Write today for Catalog of PAINE Anchoring devices and building, installing and maintenance and electrical specialties.

Let our experts solve your difficult anchoring problems. No obligations of course.

The Paine Co.
2975 Carroll Ave.
Chicago, U. S. A.

THERE ARE "BESTS" IN EVERY INDUSTRY

IN ELECTRICAL APPLIANCES IT'S

Sunbeam

Automatic **MIXMASTER**
Double Automatic **IRONMASTER**
SILENT AUTOMATIC TOASTER
Automatic **COFFEEMASTER**
SHAVEMASTER
FLAT TOASTER • FAN HEATER
GLASS COFFEE MAKERS
WET-PROOF HEATING PAD
MASTER PLUG & CORD SET

MADE AND GUARANTEED BY
CHICAGO FLEXIBLE SHAFT COMPANY
5600 West Roosevelt Road, Chicago, Illinois
316 Commercial Street, Los Angeles, Calif.
224 S. W. Temple Street, Salt Lake City, Utah
557 Market Street, San Francisco, Calif.
50 YEARS MAKING QUALITY PRODUCTS

TRADE NOTES

Dealers & Distributors

CLEARING UP a misunderstanding resulting from the announcement that Willis F. Dunbar had been made Bryant Electric Co.'s northern California representative, Willis R. Dunbar, formerly of Westinghouse Co., and for the past several years an insurance broker, explains that he is the uncle of Willis F. Dunbar and is himself, still in insurance. Willis R. Dunbar is moving his brokerage office July 1 from 315 Montgomery St., to 54 Sansome St.

GRAYBAR ELECTRIC CO. has been named distributor of Thermador electric ranges for northern California, according to W. E. Cranston, vice-president of the Thermador Electric Mfg. Co., which recently merged with Woolwine-Norris Corp.

APPOINTMENT of Gay Engineering Corp., Los Angeles, to represent Carrier Corp., Syracuse air conditioning manufacturers, exclusively in Los Angeles County, has been announced. In addition, the Gay Corp. will handle larger installations than those for which local Carrier dealers may be franchised in the eleven Western states. The Carrier Corp. will maintain a direct office in Los Angeles under the supervision of J. C. Shea, to assist dealers. A warehouse will also be located there.

ELECTRICAL TESTING LABORATORIES

Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory.

2 East End Ave. New York

G.C.A.
Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks

Send for Catalogue
We have been making safety tools for 24 years

THE G. C. A. Manufacturing Co.
Pittsfield, Mass.

THE AMERICAN CROSS ARMS, INC., has announced through its president, P. N. Coleman, the establishment of a branch manufacturing and distributing plant in Portland, Ore. Machinery and plant will be located in the Grand Rapids Store Equipment Co. building.

The capacity of the plant, which is to employ thirty skilled laborers, will be six million board ft. a year. There will be installed the most modern kiln-drying facilities.

Leo Coleman, Jr. will be in charge of sales, while J. E. Long will be general manager in charge of operations. President Coleman will supervise the installation of the plant and will handle all details in connection with local branch operations.

Other American Cross Arms plants are located at Jacksonville, Fla., and Philadelphia.

BROWN-JOHNSTON CO., Spokane, recently opened a new model kitchen in their store, and conducted a two-day cooking school, with Miss Shirley Ochs, of the Washington Water Power Co.

TORK CLOCKS

NEW ELECTRICALLY DRIVEN 1939 MODELS NOW AVAILABLE

WITH PLAIN OR ASTRONOMIC DIALS

Whenever it is desired to turn Current on and off Regularly there is a new model Tork Clock that can do it.

THE TORK CLOCK CO., Inc.
MOUNT VERNON, N. Y.

Representatives:
A. R. Slimmon, 445 E. 3d St., Los Angeles
Nicholas & Cook, 1063 Howard St., S. F.
H. M. Sayers, 1019 Eastlake Ave., Seattle
Stevens Sales Co., 41 P. O. Place, Salt Lake City

CLASSIFIED SECTION

● COST of undisplayed classified ads is 5 cents a word, minimum $1.00 insertion. Box numbers in care of our San Francisco office count as 10 words additional in undisplayed ads. ● RATES per column inch of displayed ads is $3.75. ● All classified ads are payable in advance.

POSITION WANTED

IN PERSONNEL DEPARTMENT. Married, Age 28. Qualified and able to handle all problems arising out of NLRB and Wage-Hour Law, through services on governmental-Industrial Labor Review and Advisory Boards. Particularly experienced in mediation and arbitration of labor controversies. Wide industrial and governmental contacts. Finest reference from utility and other industries. Salary and location secondary. Box 22, Electrical West, 883 Mission St., San Francisco, Calif.

Storekeeper- Shows $8000 Savings by Reclaiming Wire with ABC Splicing

Using a large ABC Machine for splicing in the storeroom.

FIGURING profits from 5c to 8c a pound on odds and ends of wire salvaged from the scrap heap, and spliced by means of a Kearney ABC Machine and Sleeves, one storekeeper shows an $8000 annual profit on reclaimed wire.

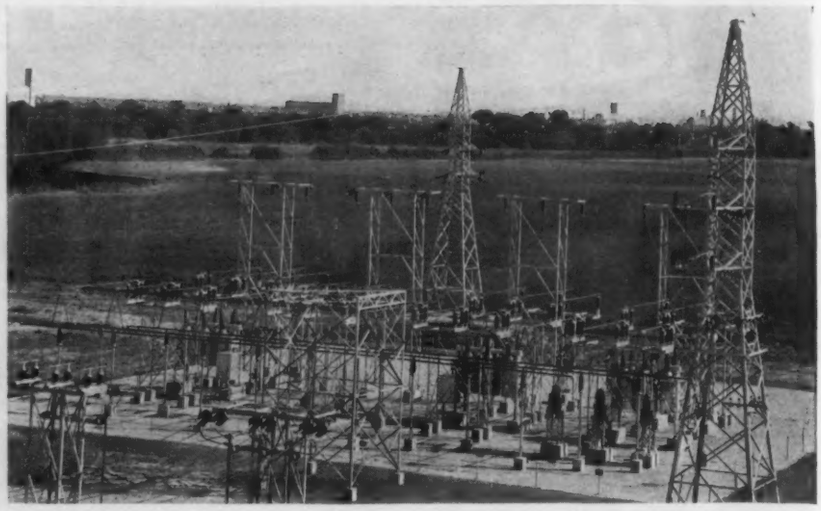
Smaller companies report savings from $256.00 up to $2000 annually.

Today, hundreds of dollars worth of wire is being reclaimed and reused by power companies . . . And there's money in your scrap heap, too. Tell us how much and size scrap you sell annually — along with your scrap and new wire prices. We want to show you how you can figure your own savings.

SMALLER ABC MACHINES

THESE handy machines are used in the field. They produce clean metal to metal contact splices on a variety of conductor sizes. Ask for details.

More information on request.



Solving a Substation Problem with POWER CONNECTORS

HAZARDS of heavy system short circuits were increasing. The use of soldered connections was fast becoming entirely unsatisfactory. This was a substation problem that had to be solved.

Kearney Engineers were aware of such conditions. They sought improvements for bolted type connectors that would give "high pressure contacts" and assure long, satisfactory service at lower costs, by overcoming expensive welding methods.

Today, you'll find many styles of Power Connectors included in the Kearney line. A few popular types are here shown. Many others that may be just what you need are shown and described in the latest Kearney Power Connector Bulletin.

Write for Power Connector Bulletin 4-C.

For Better Maintenance and Construction—

Use KEARNEY PRODUCTS

EXCLUSIVE SALES REPRESENTATIVES **MAYDWELL & HARTZELL INCORPORATED**

LOS ANGELES • SAN FRANCISCO • PORTLAND • SEATTLE • PHOENIX • RENO • TACOMA • SPOKANE

THE VALLEY ELECTRIC, LTD., Vernon, B. C., has completed the electrical installation in the modern new service garage and gas station erected in Vernon by the Standard Oil Company of British Columbia, Ltd.

BRETTELL LTD., Vancouver wholesale electrical supplies dealers, manufacturers' agents, and electrical equipment specialists have been appointed agents for the wire goods division of Cables Conduits & Fittings Ltd.

MOODY & ROSSITER, electrical appliance dealers, have moved their store from Magna, Utah, to 269 South State St., Center Theater Bldg., Salt Lake City. The firm had been in business in Magna during the past four years.

D. E. SANFORD CO. is opening a new office in Portland, Ore., with D. Dunning in charge. The company has recently been appointed Pacific Coast and Hawaiian representative of the Nu Tone Chimes Co., Cincinnati, Ohio.

RAILLEY CORPORATION, manufacturer of the Pin-It-Up lamp, has been upheld in the Federal Court in its patents and registered trademark on the Pin-It-Up lamp. A suit recently filed against infringers has been settled prior to trial with a consent decree entered in its favor.

CANADIAN RADIO CORP. LTD., manufacturers of Majestic radios, have appointed Taylor and Pearson, B. C., Ltd., Vancouver, as distributor for British Columbia, also for Rogers radio tubes.

HAWAIIAN ELECTRIC CO., Ltd., has been using newspapers to tell their advertising story. Handsome ads feature Hotpoint ranges and home lighting. Institutional copy is also being used effectively.

TEN NEW MODELS, paced by an automatic oven type toaster, will appear in the Westinghouse appliance line for 1940. The entire line has been restyled according to the company's merchandising department, and new features and improvements include: a two-slice adjustable and thermostat controlled toaster, oven type, priced slightly higher than the conventional turnover type; a signal turnover toaster, a twin waffle iron, rectangular in shape, with 12% more area than the standard size round waffle iron; an adjustable waffle iron with 21% faster preheating time. Three new percolators and a new sandwich grill complete the new models.

For a limited time only, Toastswell offers you the biggest FREE merchandise deals of the year with a minimum purchase of the fastest moving, matched items in the Toastswell line.

But you'll have to hurry if you want to get in on this chance to make some big extra profits . . .

So see your Jobber at once or write us for complete details.

UTILITY ELECTRIC CO.
620 TOWER GROVE AVENUE ST. LOUIS, MO.

ABOUT PEOPLE

Cordiner Leaves G-E For Shick Presidency

Ralph J. Cordiner, who began his electrical industry career 20 years ago on the Pacific Coast, has resigned as manager of the appliance and merchandise department of General Electric Co. to become president of Schick Dry Shaver, Inc., of Stamford, Conn. Cordiner's first position was as part time salesman with Pacific Power & Light Co. while attending Whitman College at Walla Walla, Wash. After graduation in 1922, he was a division commercial manager for that company. A year later he joined the Edison G-E Appliance Co. sales organization in Portland. Before going East with G-E in 1932, he was successively Northwest manager and Pacific Coast manager of Hotpoint. His rise with G-E was rapid—from manager of the company's merchandise department to manager of the appliance and merchandise department and chairman of the appliance sales committee.

JAMES R. KEARNEY, president of Kearney Corp., St. Louis, recently visited San Francisco and Los Angeles with Mr. E. J. DeRight, Kearney vice-president, Mrs. DeRight, and Thomas D. Bash, former Kansas City sheriff.

Electric Associates Name Newton Northwest Head

L. F. Newton, formerly a west coast electrical manufacturer, will head the recently organized Pacific Northwest section of Electric Associates, with offices in Portland. Backed by the sales and manufacturing resources of the Reliance Electric & Engineering Co., the Clark Controller Co. and the Electric Machinery Mfg. Co., Newton will cater particularly to the requirements of such major Pacific coast industries as paper, lumber, canning and fishing. Electric Associates, organized throughout the Western States to provide company representation, will open additional western offices in the future and may eventually include assembly and manufacturing in its range of activities, Newton said.

H. S. SCHULER, formerly division manager of the advertising department of the Westinghouse Electric & Manufacturing Co., at East Pittsburgh, is now sales promotion manager of the Pacific Coast district of the company with headquarters in San Francisco. Schuler was in charge of industries' advertising before coming to the Coast. He succeeds Earl W. Nilsson who has resigned.

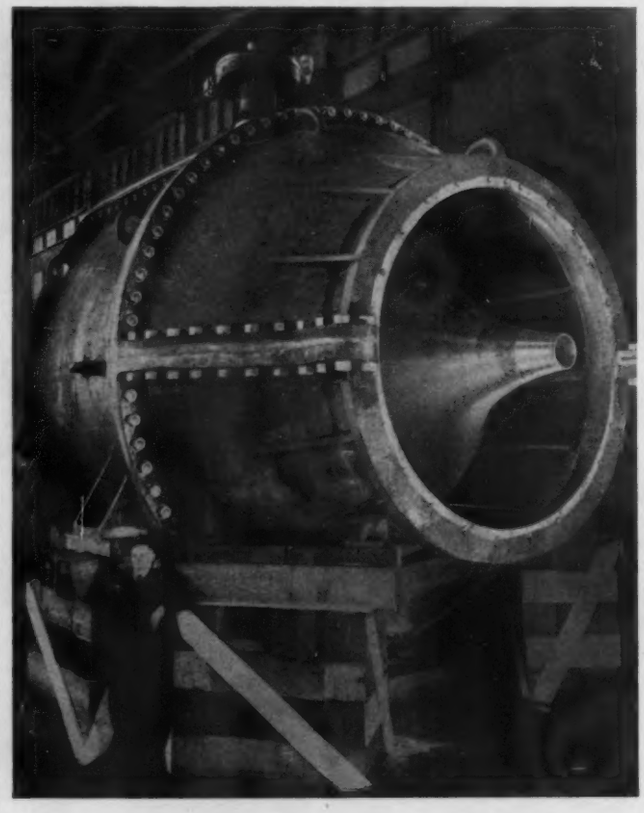
H. T. PLUMB, a member of the Salt Lake City office of the General Electric Co. since 1912, has been appointed consulting engineer of the Rocky Mountain district, with headquarters in Denver. Plumb, who has been with G-E for 30 years, took over his new duties Aug. 1.

WALTER W. R. MAY, director of industrial development of Portland General Electric Co., was elected vice-president of the American Institute of Public Relations, at a meeting of the organization in San Francisco.

68 POST ST., SAN FRANCISCO

is now the Pacific Coast headquarters of McGraw-Hill. Purpose of the move: to make possible faster, more efficient service. Editorial and business offices for ELECTRICAL WEST, coast representatives for all other McGraw-Hill magazines, and the McGraw-Hill and Whittlesey House books are now situated at 68 Post Street, San Francisco—just off Market.

McGraw-Hill Co. of California — McGraw-Hill Publishing Co.
Electrical West — McGraw-Hill Book Co.



180-ton Larner-Johnson Free Discharge Regulator designed by Pelton engineers. Shop view shows valve in full open position.

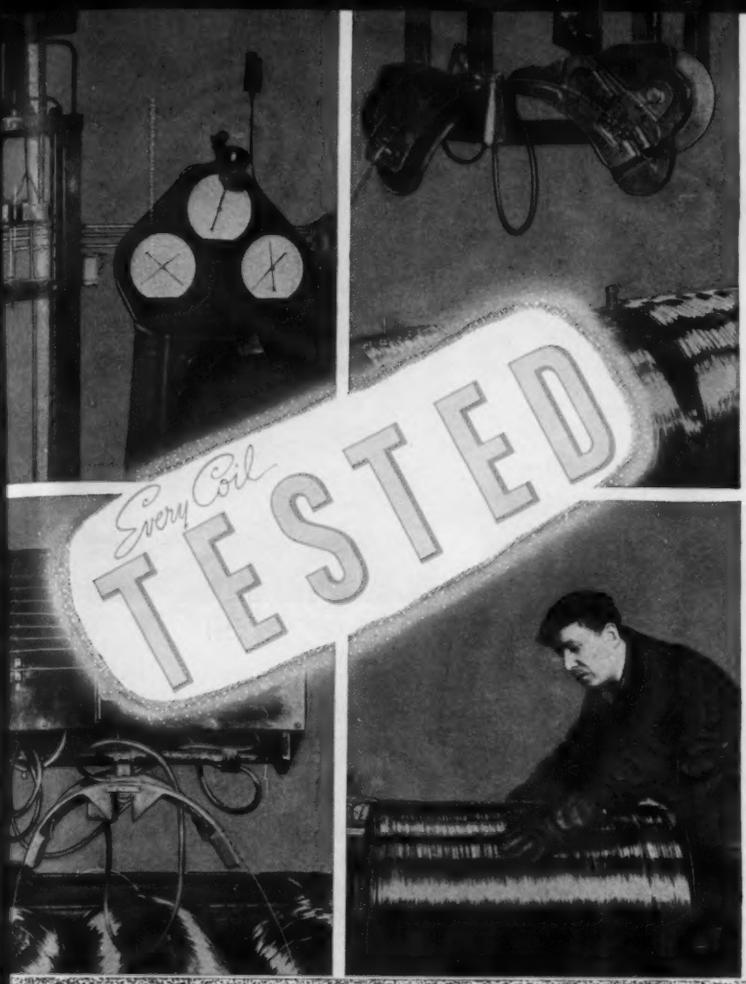
TWO discharge regulators of the Larner-Johnson type, designed and built in our San Francisco works, have recently been shipped for installation in the discharge works of San Gabriel Dam No. 1. They will be utilized for flood control service for the Los Angeles County Flood Control District.

Each unit measures 25 ft. in height by 30 ft. in length, weighs 360,000 lbs., and is capable of discharging 5600 second feet under full static head. Under shop tests of 215 lbs. sq. in. both valves were practically drop tight, indicating the extreme accuracy with which design and construction was carried out.

The Pelton Water Wheel Company
HYDRAULIC ENGINEERS

120 Broadway NEW YORK — 2919 Nineteenth St. SAN FRANCISCO — Paschall Station PHILADELPHIA

PELTON



EVERY COIL* OF COPPERWELD WIRE MUST PASS THESE 9 EXACTING TESTS:—

1. **DIAMETER**—determined at both ends and middle of every coil.

2. **SURFACE INSPECTION**—The surface of every coil of Copperweld wire is inspected for smoothness and freedom from surface imperfections not consistent with the best commercial practice.

3. **BREAKING LOAD**—Every coil tested. Wire used in strand tested before stranding.

4. **ELONGATION**—Every coil tested. Elongation in ten inches must not be less than 1½%.

5. **BEND TEST**—Made on pieces from both ends of every coil—is indicative of ductility of both steel and copper.

6. **WELD TEST**—Pieces of wire from both ends of every coil broken in the bend test are carefully examined at the break. There must be no separation of copper from steel.

7. **KINK TEST**—Made on pieces from both ends of every coil to guard against seams, laps and other exterior imperfections. It likewise tests the ductility of the metals.

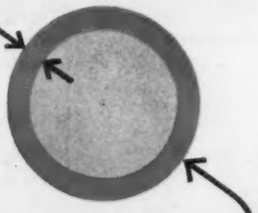
8. **CONDUCTIVITY**—Every coil is tested at both ends and the middle on a special instrument.

9. **COPPER THICKNESS**—The special equipment shown, actually measures the thickness of copper on both ends of every coil.

*Wire used in strand tested before stranding.

Every coil is numbered, and this tag signed by the inspector is attached, certifying that the coil has passed the nine tests. Detailed individual inspection reports are kept on file.

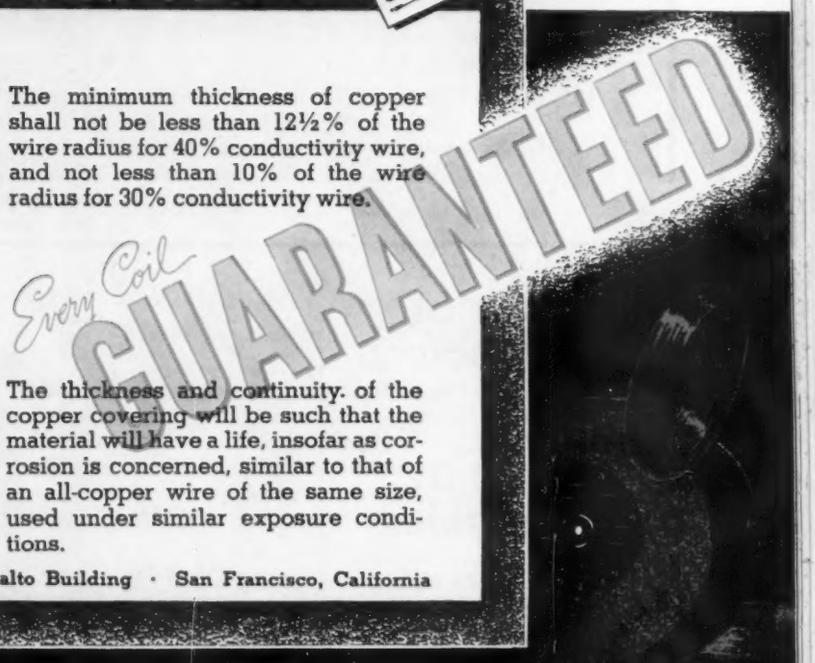
Guaranteed COPPER THICKNESS



The minimum thickness of copper shall not be less than 12½% of the wire radius for 40% conductivity wire, and not less than 10% of the wire radius for 30% conductivity wire.

Guaranteed RUST-RESISTING LIFE OF SOLID COPPER

The thickness and continuity of the copper covering will be such that the material will have a life, insofar as corrosion is concerned, similar to that of an all-copper wire of the same size, used under similar exposure conditions.



Pacific Coast Representative: C. E. INGALLS · Rialto Building · San Francisco, California

COPPERWELD
WIRE AND STRAND

COPPERWELD STEEL CO. *Glassport, Pa.*

G-E Lamp Moves up Two Managers

L. B. Wilson, who for three years has served as assistant manager of South Pacific division, G-E Lamp Dept., Los Angeles, has been named manager of North Pacific division at Portland. Wilson joined the Federal Lamp division of the National Lamp Works of G-E in 1924 at Oakland, but soon was transferred to Seattle. In 1928, he returned to Pacific Division at Oakland, and in 1935, he was promoted to the South Pacific division office. He is to be succeeded by W. H. Robinson, Jr.

Harold A. Olson, who for more than two years has been manager of G-E North Pacific Division, Portland, is being sent to New York City to become assistant manager of Atlantic Division, the largest of G-E Lamp Dept.'s 17 sales divisions. Olson entered the employ of G-E at Nela Park in 1916, and later was granted leave to finish his studies at Syracuse University. In 1925 he was assigned to sales and engineering field work for the Incandescent Lamp Dept., and in 1932, was appointed assistant manager of Buckeye division, Cleveland.

WILSON

OLSON

H. C. McDaniel has joined the commercial engineering staff of the Westinghouse Lamp division at Bloomfield, N. J., and will devote his time to special lighting and other promotional activities. McDaniel received his bachelor of science degree in electrical engineering at Oregon State College in 1926, and shortly after graduation became affiliated with Pacific Light & Power Co. in Portland. In 1934, he left the Pacific Coast to become manager of lighting sales for the Central Illinois Public Service Co.

F. H. Murphy, electrical engineer with Portland General Electric Co., was appointed by Governor Charles A. Sprague to the board of Engineering Examiners of the state July 1, to succeed F. D. Weber, electrical engineer of the Oregon Insurance Rating Bureau, who retired from the Board at his own request after 20 years service.

Felix Bersano has opened a new G-E appliance store in San Jose, the Bersano Appliance Co., where he will cater to the large percentage of Italian and Portuguese people in the San Jose trading area. Bersano is well known in the local Italian colony and has advertised consistently over an Italian radio program. For the past two years he owned and operated the Oakland Appliance Co., carrying a G-E line.

★ *For Quick Service on Quality Products from Local Stocks*

Get in Touch with: **GEO. E. HONN CO.**

420 MARKET ST. SAN FRANCISCO, CAL.

MANUFACTURER'S REPRESENTATIVE FOR:

PYREX INSULATORS, POWER AND RADIO
Corning Glass Works
FUSES, RESISTORS, MOUNTINGS, CUTOUTS, FUSE LINKS, DISCONNECTS, BUS SUPPORTS
Schweitzer & Conrad, Inc.
CAPACITATORS
Cornell-Dubilier Corp.
TRANSFORMERS, POWER AND DISTRIBUTION
Gardner Electric Manufacturing Co.
CURRENT TRANSFORMERS, NIAGARA AIR INSULATED
Lee Skipwith Company
CABLE GRIPS
Kellems Products, Inc.
CONNECTORS, GROUND ROD CLAMPS, UTILITY HOIST
Jasper Blackburn Products Corp.
GUY WIRE PROTECTORS, CONE ANCHORS, EARTH AUGERS
The Specialty Device Co.
GROUND LINE POLE AND GREEN WOOD TREATMENT
Osmose Wood Preserving Company
TONG TEST AMMETERS—LOW VOLTAGE GENERATORS
Columbia Electric Mfg. Co.
UNDERGROUND CABLE TOOLS & EQUIPMENT
T. J. Cope, Inc.
TREE TRIMMING EQUIPMENT
TREE SURGEONS' TOOLS
Bartlett Manufacturing Co.
FRICTION AND RUBBER TAPES
Clifton Manufacturing Co.
METER JEWELS
Herman D. Steel Company
SAFETY LINE TOOLS
Burnham Line Tool Company

Stocks at San Francisco
Electrical Specialty Co., Inc.,
316 Eleventh Street

Stocks at Los Angeles
Electrical Specialty Co. of So. Calif.,
451 South San Pedro Street

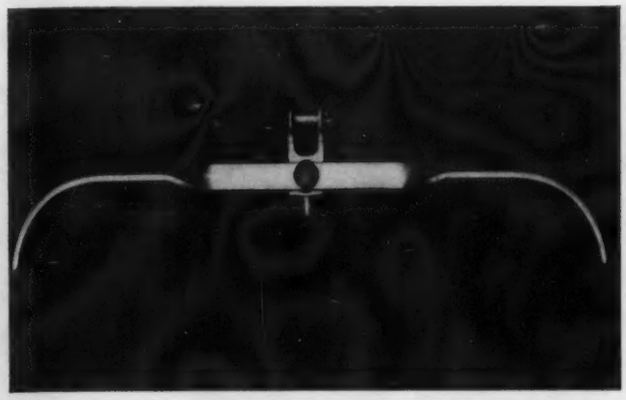
Stocks at Seattle
Electrical Specialty Co., Inc.,
714 Fourth Avenue

For the Coast Trade

At your doorstep you now have an adequate stock of popular D-H alloys, wires, ribbons, rods and other forms.

Driver-Harris Company
Harrison, N. J.

TRADE MARK REG. U.S. PAT. OFF.
Nichrome



Forged by BTC

It's a great feeling to point to an especially ticklish job and say, "We forged it."

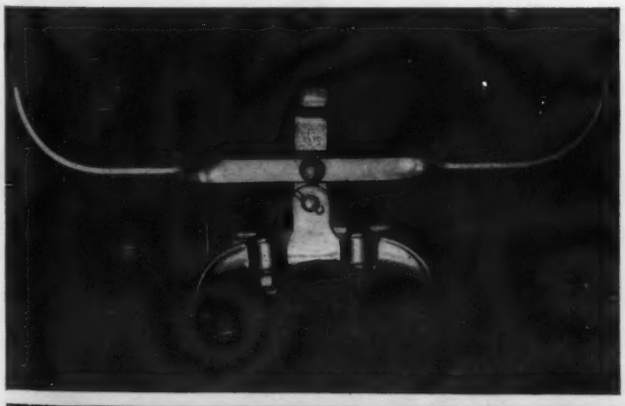
And it seems as if BTC can look over these United States and put a finger on quite a few important projects that handed over the tough ones to be forged.

But as the old saw goes "The bigger they are the harder they fall." So bring them on.

However, there's a reason; a very good reason for handing these hard jobs to BTC. Forgings are dependable and BTC offers this dependability plus a knowledge of the engineers requirements.

Designed through the cooperation of the utility engineer and insulator manufacturer together with the knowledge of a half-century of forging BTC offers the finest hi-line hardware obtainable. Specify—BTC

Through Your Insulator Manufacturer



THE OLD FAMILY ALBUM

Of what interest is this remarkable picture to you? Well if you will just read all this copy, we will tell you.

Why did we use it? Well, to tell the truth —just because it was old. You see, back in the gay nineties the commercial photographer was interested in getting faces rather than equipment and although we have quite a stock of old prints in the files, they are mostly crowded with people.

But believe it or not; there's a pair of old fashioned button shoes in the picture. Don't strain your eyes. He's right in the center—sixth in from the left.

Incidently this photograph was restored from a very faded yellow print. Just how old it is we don't know, but we believe it consists of some of the original employees. And now the reason for the print—just to prove that we are an old reliable corporation and that the BTC trade mark is as good as gold.

Established 1834

High Tension Suspension Line Hardware

THE BREWER-TITCHENER CORPORATION

Index to Advertisers

AUGUST, 1939

Allis-Chalmers Mfg. Co. 12, 13

Blackburn Products Co., Jasper..... 60
Brewer-Titchener Corp. 75
Briegel Method Tool Co..... 11
Burndy Engineering Corp..... 11

California Oregon Power Co.....42, 43
Classified Section 69
Chicago Flexible Shaft Co..... 69
Colt's Patent Fire Arms Mfg. Co.... 7
Copperweld Steel Co..... 73
Corning Glass Works..... 3
Crescent Ins. Wire & Cable Co..... 61
Crocker First National Bank..... 60

Driver-Harris Co. 74

Edison Gen. Elec. Appliance Co., Inc. 16, 17
Electrical Testing Labs..... 69

Gardner Elec. Mfg. Co..... 57
G. C. A. Mfg. Co..... 69
General Electric Company..1, 9, 59, 68

Honn Co., Geo. E..... 74

Idaho Power Co.....42, 43
Indiana Steel & Wire Co..... 8

Jeffries Transformer Co..... 62

Kearney Corp., James R..... 70
Klein & Sons, Mathias..... 4

Line Material Co..... 65

Maydwell & Hartzell, Inc..... 70
Montana Power Company, The...42, 43

National Carbon Co., Inc..... 67
Noblitt-Sparks Industries 56

Pacific Coast Elec. Bureau...Back Cover
Pacific Gas and Electric Co...3rd Cover
Paine Company 69
Pelton Water Wheel Co..... 72
Portland General Electric Co.....42, 43
Puget Sound Power & Light Co...42, 43

Reliable Electric Co..... 6
Roebling's Sons Co., John A..... 63
Roller-Smith Co. 8

Schweitzer & Conrad, Inc..... 53
So. Calif. Edison Co., Ltd...2nd Cover
Specialty Device Co..... 62
Square D Company..... 55
Superior Switchboard & Devices Co. 57

Tork Clock Co., Inc..... 69
Triangle Conduit & Cable Co., Inc.. 18

Union Carbide & Carbon Corp..... 67
Utah Power & Light Co.....42, 43
Utility Electric Co..... 71

Vent-A-Hood Co., The 60

Washington Water Power Co.....42, 43
Westinghouse Electric & Mfg. Co.... 14
Weston Elec. Instrument Co..... 5
Wiegand Co., Edwin L..... 60
Wiremold Co., The..... 10

PROFILES OF THE MONTH

Harry H. Fogwell, (left) president of the Thermador Electrical Mfg. Co., and W. E. Cranston, vice-president, recently figured in a consolidation with the Woolwine-Norris Corp. They are planning extensive operations to maintain more efficient production facilities in the future

Clare Smallcomb, new president of the Los Angeles Estimators' Club, has a word to say to his fellow members at their weekly luncheon held in the Chamber of Commerce building

G. B. Kirkwood, district representative of Pacific Electric Mfg. Corp., Los Angeles; Floyd Hunt, Southern California Edison Co. and A. C. Schwager, vice-president of Engineering, Pacific Electric, meet at the company's plant during the AIEE convention in San Francisco

The first showing of the new 1940 models of Philco radios by Thompson & Holmes, Ltd., San Francisco, northern California distributors, attracted over 300 dealers to the evening dinner meeting held June 20, in the Western Merchandise Mart dining room. Grouped below are four Philco-minded gentlemen, (left to right) Harry Boyd Brown, Philco national merchandise manager; R. E. Crane, secretary, Thompson & Holmes; C. S. Bettinger, Pacific Coast Philco manager, and J. M. Skinner, Jr., assistant to the president of Philco Radio & Television Corp.

Symbol of the newly formulated **RED SEAL** wiring plan for Northern California is NC-39. And here's a deal to help you sell it. From now until the end of the year, the Pacific Coast Electrical Bureau will provide an illuminated house number to each of your customers who specifies **RED SEAL** wiring—at no cost to him or to you.

Here for the first time is a definate selling tool to help you get a prospect's attention and make him listen while you tell your story. And what a story it is!—convenience—safety—better lighting—adaptability to future needs—and all without a single extravagant or impractical feature. Just an honest, workmanlike job.

Remember that NC-39 is **RED SEAL** adapted to local California requirements and so flexible you can recommend it for a cottage or a mansion. If you will talk it up constantly and sell it wherever possible, you will find that one person will tell another and soon your customers will be asking for **RED SEAL** ADEQUATE WIRING.

See about the house numbers today. Either call the Bureau at 447 Sutter Street, San Francisco, or the nearest P.G. & E. office.

P·G·and E·
PACIFIC GAS AND ELECTRIC COMPANY

EW 108-839

Sheffield Village in Oakland—315 homes wired to Red Seal specifications.

315 HOMES WITH CERTIFIED WIRING

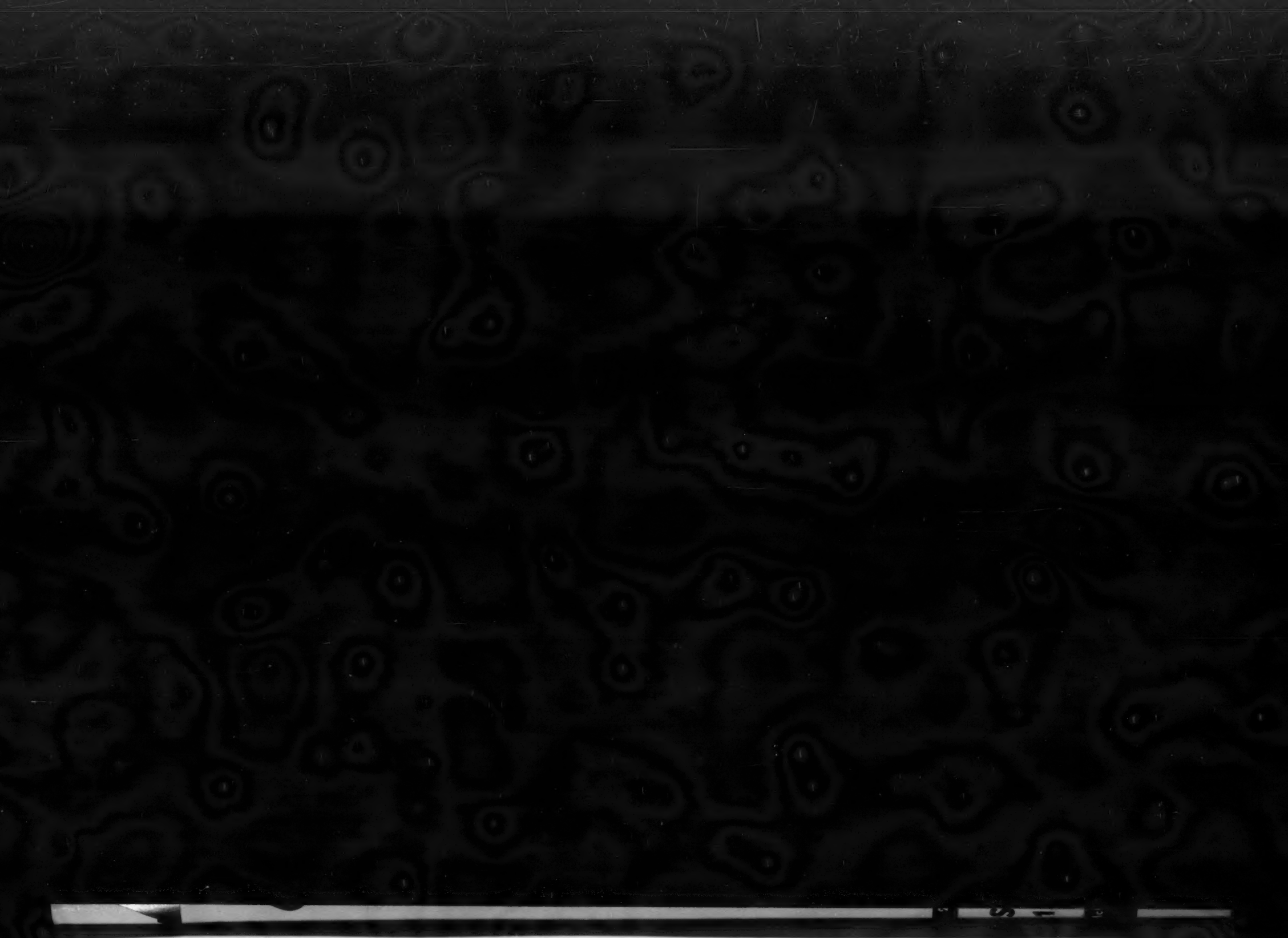
The homes in this group will need 315 vacuum cleaners, 315 electric refrigerators, 315 portable heaters, 630 radios, 630 clocks, 630 floor lamps and at least double that number of table lamps, besides mixers, toasters, dishwashers, fans, waffle irons, washing machines, ironers, door chimes, sunlamps, electric razors, sewing machines, and an almost endless list of other electrical equipment.

The 315 families that live in these homes will be continually in the market for new electrical appliances and service, because they can use them freely wherever they are wanted—**thanks to adequate wiring.**

This village is wired to Red Seal specifications because the builders know that people buying homes are impressed with the importance of the wiring and that a Red Seal certificate delivered to each purchaser along with the deed helps sell the home and gives the builder an enviable reputation for progressiveness.

The wave of public opinion is favorable to the electrical industry—one big concerted drive will see this adequate wiring movement sweep the West and every new home that goes up will open opportunities for this industry.

Join the march of electrical progress. Tell the adequate wiring story at every opportunity—talk, write, wire, advertise and publicize ADEQUATE WIRING.

PACIFIC COAST *Electrical* BUREAU

447 SUTTER STREET, SAN FRANCISCO • 601 WEST 5TH STREET, LOS ANGELES